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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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CUTANEOUS LEISHMANIASIS.

(Critical Review of Recent Russian Work.)

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Cutaneous leishmaniasis is of considerable importance in the subtropical parts of the Soviet Union, where the disease is endemic, with a high case incidence. In these regions there also occur epidemic outbreaks, especially among groups of newcomers, such as government officials, agricultural labourers and soldiers. Towards the end of the last century, during the Turkestan campaign, up to 100 per cent. of the troops were affected, while during the last world war the incidence among the Russian troops in Asia reached 70 per cent. Thus, apart from its general importance, cutaneous leishmaniasis in Russia has always been a military problem as well. At present, when considerable Soviet forces are concentrated in Central Asia, the danger of cutaneous leishmaniasis spreading among the troops is again causing some concern.

Although investigations of oriental sore by Russian workers (including the original discovery of the causative organism : see this *Bulletin*, 1938, v. 35, 876) go back to the last century, some of the most outstanding observations have been carried out in recent years. The present position regarding this disease in the Soviet Union was discussed at the *First Conference on Cutaneous Leishmaniasis*, held at Ashkhabad in 1940. The conference dealt with the aetiology, epidemiology and clinical aspects of the disease, as well as with its transmission and control. The conclusions arrived at by the Conference were to serve as a basis for practical measures in combating the disease.

The present review is based, in the first place, on a symposium of works submitted to the Conference and published under the general title " *Problems of Cutaneous Leishmaniasis* " (1941) ; secondly, on a pamphlet by Kojevnikov (1942 b), giving a popular exposition of the disease in all its aspects ; and finally, on a series of papers which have appeared in various Russian periodicals during the last few years. The findings of the Russian workers are of general interest, for they throw light on a number of problems concerning cutaneous leishmaniasis in different parts of the world, which have hitherto remained unsolved.

Distribution.

Cutaneous leishmaniasis has a wide distribution in the subtropical regions of the Soviet Union (PETROV, 1938; KOJEVNIKOV, 1941 a; GITELSON, 1941; POPOV, 1941; KOLESNIKOV & DJAFAROV, 1941; KOUZIAKINE, 1941; MIRZAYAN, 1941; SHAGALOV, 1942). It is endemic over a large area in Asia, bordering with Afghanistan and Persia, and in the Caucasus.

In Middle Asia (former Russian Turkestan) the disease is prevalent both in small settlements or villages and in towns. In rural districts it occurs mainly along the valleys of the rivers Atrek, Tedjen, Murgab, Amu-Daria, Kashka-Daria, Zeravshan, Syr-Daria; also in the irrigated oases of the Turkoman desert and on the isle Tcheleken (Caspian Sea). The most important urban endemic foci are the following towns: Takhta-Bazar, Serakhs, Tedjen, Merv, Ashkhabad, Tchardjou, Kerki, Bosaga (in Turkmenistan); Termez, Khorezm, Old Bokhara, Bekh-Budi, Katta-Kurgan, Samarkand, Fergana, Andijan, Kokand (in Uzbekistan); Khodjent (in Tadjikistan). In the Caucasus, cutaneous leishmaniasis is found in the Transcaucasian republics of Azerbaidjan (Baku, Kirovobad, Lenkoran, Gandzha, Barda), Georgia (Gori) and Armenia. Formerly the disease extended further to the west and was endemic in the Crimea, but at present this peninsula appears to be exempt. From time to time new foci have arisen (*e.g.* in Baku and Gori), to disappear again, temporarily or for good (as in Tashkent).

Clinical Aspects.

Since the end of the last century Russian physicians have recognized the existence in Turkestan of two clinical forms of cutaneous leishmaniasis, which the majority were inclined to regard as variants of the same disease, connected by transitional forms. The various clinical manifestations were attributed to differences in the individual reactions of the human host. However, this interpretation failed to provide a satisfactory solution to a number of questions. The whole problem has been thoroughly re-investigated during the last decade, and it has now been established that in Middle Asia (and probably elsewhere) oriental sore in man is represented by two distinct clinical types, which are independent nosological entities. One is the so-called "dry" type which is prevalent in towns and in which the papules persist for months before they ulcerate, the course of the disease being chronic. The other is known as the "moist" type; it occurs in the open country, its lesions ulcerate in about a week or two, while the disease runs an acute course. KOJEVNIKOV (1941 b) defines the two types as "*Leishmaniosis tarde exulcerans*" and "*Leishmaniosis cito* (*s. acute*) *necrotisans*" respectively. However, already at the Conference these terms have been criticized as being inexact and misleading. Since they are also incomplete, the following amended definitions might be more appropriate: (1) *Leishmaniasis cutanea tarde exulcerans*, for the "dry" type; and (2) *Leishmaniasis cutanea cito exulcerans*, for the "moist" type.

The differential characteristics of the two types are brought together in the accompanying table (compiled from the papers by KOJEVNIKOV, 1941 b, 1942 b; LATYSHEV & KRIUKOVA, 1942).

Characteristics of the Two Types of Cutaneous Leishmaniasis.

	1.	2.
Definition ...	"Dry" type, with late ulceration. *Leishmaniasis cutanea tarde exulcerans.*	"Moist" type, with early ulceration. *Leishmaniasis cutanea cito exulcerans.*
Synonyms (Russian)	Ashkhabad or Kokand sore; chronic, papular form; "Godovik" (=annual)	Pendeh or Sart sore; acute, ecthymatous, ulcerating form.
Incubation Period	Long (2–6–12 months)	Short (1–6 weeks).
Course of Disease	Chronic; unbroken "dry" papules persisting several months: ulceration retarded. Duration up to 12 months (or longer)	Acute; "moist" lesions, ulcerating rapidly (in 5–10 days). Duration less than 6 months.
Lymphangitis ...	Rare (10%)	Common (70%)
Parasites in lesions	Numerous	Scanty
Virulence for mice	Low	High
Distribution ...	Mainly in towns (=urban type)	Mainly in open (desert) country (=rural type)
Seasonal occurrence	Perennial	Aestivo-autumnal
Reservoir Hosts	Not known (possibly domestic rodents)	Wild rodents (chiefly gerbils).

There is no mention of the occurrence of mucocutaneous leishmaniasis in Middle Asia.

The independent nature of the "dry" and "moist" forms is further supported by the following observations: (1) KOJEVNIKOV (1942 a) records 15 cases of spontaneous oriental sore in which lesions of both types were co-existent in the same individual. He also observed cases in which persons, who had been successfully vaccinated with sores of the "dry" type, subsequently acquired a natural infection (superinfection) with sores of the "moist" type. In all these instances there was a combined infection with the two types of oriental sore, each running its own characteristic clinical course. It was thus demonstrated that infection with or recovery from one type of cutaneous leishmaniasis does not confer immunity against the other type. In other words, there is no cross immunity between the two types, which are, therefore, immunologically distinct. (2) It has also been demonstrated that in experimental infections from man to man with sores of either type the course of the disease in the recipient invariably corresponded to that in the donor (LATYSHEV & KRIUKOVA, 1942). Similarly, the inoculation of pure cultures provoked in man lesions which had the pathogenic characteristics of the strain of parasites used in the experiment (KOJEVNIKOV, 1941 b). These observations show that the two forms of oriental sore remain true to type after transmission.

KOJEVNIKOV (1941 c) also describes some interesting observations on latent forms of cutaneous leishmaniasis. In the course of mass vaccinations (670 persons) with living parasites it was found that among

persons in whom the vaccine had apparently not " taken " the number of subsequent natural infections with oriental sore was comparable to that in the successfully vaccinated group, and was half of that in the control group. The development of a partial immunity in the first group would seem to point to the presence of an inapparent infection. Further, it was noted that 19 out of 36 persons, who had been living in an endemic area (Ashkhabad) for more than five years but had never suffered from cutaneous leishmaniasis, gave a positive allergic skin reaction to leishmania vaccine. In view of the high specificity of this test (*vide infra*) and the fact that the lesions, had they been present, could not have been overlooked, it is concluded that the majority of these persons had had inapparent infections in the past. In a number of other patients, with healed oriental sores, the scars still showed signs of a mild active process (hyperaemia, oedematous swelling, focal infiltration). Such cases are thought to be instances of a protracted infection. [Similar cases have recently been described by BERLIN from Palestine (see this *Bulletin*, 1940, v. 37, 777)]. ISSAYEV (1941) points out that in Bokhara latent cutaneous leishmaniasis also occurs in dogs.

Pathology.

The histopathology of chronic and acute cutaneous leishmaniasis, according to KAPINA (1941), is characterized by the development in the dermal layer of the skin of infiltrations consisting of epithelioid and lymphoid elements, with numerous leishmania inside and outside the macrophages. At the stage of complete ulceration the parasites disappear from the infiltration, while destructive and degenerative processes become predominant. The blood vessels in the affected area undergo inflammatory changes. From the histopathological point of view, acute and chronic forms of oriental sore are said to differ in the degree of development of the inflammatory process, *i.e.* the difference between them is quantitative rather than qualitative.

KOLESNIKOV & DJAFAROV (1941) note that in secondary lesions, appearing later, the infiltration has a tuberculoid structure, with few or no parasites. This structure is regarded as a manifestation of an allergic reaction on the part of the host, appearing at a certain phase of development of immunity.

IGOCHINE & TSCHERNIAK (1941) describe the typical changes taking place in the capillary system of the papular lesion in the " moist " type of cutaneous leishmaniasis. The capillary loops become dilated, their meshes are broader than usual, and there always develops a dense anastomosing subpapillary network. These changes are restricted to the area covered by the papule and they disappear as the lesion heals.

Diagnosis.

DOUBOVSKOY (1941) describes an allergic skin reaction which can be employed as an auxiliary diagnostic method for cutaneous leishmaniasis. A vaccine, prepared from cultures in a milk medium (described by DUBOVSKOY, 1939, 1942), is injected intradermally into the arm, the dose being 0·1 cc. containing 100,000 parasites. In a positive reaction there appears at the site of injection a swelling, which disappears within the first hour. After 8–15 hours there develops a reddish

spot which gradually increases in size and is raised above the surface of the skin. The reaction reaches its full development by the end of 48 hours, after which it subsides.

This reaction was tested on 442 persons. It was positive in 93·2 per cent. of a group of 220 persons with established sores, and in 98·7 per cent. of a group of 74 who had recovered from oriental sore, while among 148 persons, who had never suffered from cutaneous leishmaniasis, or who denied any previous infection, the reaction was negative in 87·2 per cent. In the case of the 19 (12·8 per cent.) positively reacting persons in the last group—all of them inhabitants of an endemic area—there was reason to suspect an undetected infection in the past (see p. 334). A positive reaction can be obtained beginning from the second month of the infection and in the course of many years afterwards. The test proved to be highly specific.

IGOCHINE & TSCHERNIAK (see p. 334) advocate capillaroscopy as a subsidiary method for the diagnosis of oriental sore.

Vaccination and Immunity.

The questions of vaccination and immunity are closely connected, for the effectiveness of the former as a prophylactic measure depends upon the degree of protection it confers.

SOKOLOVA (1940, 1941) describes the results of large-scale vaccinations against cutaneous leishmaniasis carried out by her in Middle Asia, using material from both types of lesions ("dry" and "moist"). The inoculations were made directly from human lesions or with living cultures. The incubation period varied from a fortnight to a year (average 4–5 months), while the infection lasted from 2 to 17 months (average 6–9 months). The total number of persons vaccinated (up to 1939) was 1,522, of whom 1,107 were followed up. The vaccination was successful in 73·8 per cent., the best results—100 per cent. positive—being obtained with cultures of parasites from sores of the "moist" type, whereas those from "dry" lesions were positive in 70·3 per cent. The effectiveness of vaccination in protecting against new infections (natural and induced) is shown by the following figures. Among 772 successfully vaccinated persons only 6·3 per cent. subsequently contracted the natural disease, while in unsuccessfully vaccinated persons natural infections were acquired by 29·3 per cent. These figures are compared with the incidence of cutaneous leishmaniasis among the non-vaccinated population of Ashkhabad, where the examination of 862 persons revealed 548 (63·6 per cent.) infected cases. Further observations were made on several hundred inhabitants of the same town who had been vaccinated late in the season (November–December). Of these 26·7 per cent. became naturally infected, while among controls living under identical conditions the incidence of fresh infections amounted to 51·3 per cent.

The course of development of immunity following vaccination was investigated in 61 persons, by reinoculating them at different intervals from the time of the appearance of the primary sore. The results were positive in 27 cases (44·3 per cent.). It was found that, as a rule, superinfection invariably succeeded 3–4 months after the primary infection, but subsequently failures became increasingly frequent, until, after one year, no reinfection could be produced. That superinfection is possible while the primary lesion is still present has been demonstrated recently by SENEKJI & BEATTIE [see this *Bulletin*, 1941, v. 38, 576].

All superinfections (both experimental and natural) have a milder and shorter course, with a shorter incubation period and fewer lesions.

It is thus seen that in cutaneous leishmaniasis the development of immunity as the result of vaccination is a slow and gradual process, its full effect being reached only in about one year after the inoculation. This fact explains the susceptibility to superinfection in a certain proportion of vaccinated persons. On the other hand, the resistance to reinfection observed among those who had been unsuccessfully vaccinated may be due to an inapparent infection produced by the vaccine (see p. 334).

On the whole then, vaccination would appear to convey absolute immunity only provided the disease is allowed to run its full course. However, the amount of immunity acquired before the termination of the process is sufficient to reduce considerably the severity and duration of a superimposed infection. In view of this SOKOLOVA recommends the adoption of vaccination on a large scale as a prophylactic measure against cutaneous leishmaniasis.

The question of immunity is dealt with more fully by MOSHKOVSKY (1941, 1942), who discusses the mechanism involved. As already mentioned, a single infection with cutaneous leishmaniasis, terminating in spontaneous recovery, produces a stable immunity which affords complete protection against reinfection. However, if the lesion is excised at an early stage, immunity will not develop at all. The results of reinoculations in the course of a pre-existing infection depend upon the phase already reached by it. In the presence of an early sore the development of the new lesion is normal, differing little from that in primary infections; whereas in later stages of the disease the development of the secondary lesion is retarded, and it may be aborted or the lesions may undergo degeneration. The symptoms of the secondary infection (superinfection) will be the less pronounced the nearer the original one approaches recovery.

These facts are interpreted on the basis of "the principle of reinoculation" which, according to MOSHKOVSKY (1937), operates in the type of immunity which is acquired in chronic infections and is also known as "premunition." SERGENT believes that premunition is governed by his "law of precedence" ("loi de préséance"), according to which homologous parasites, when introduced into a host with a pre-existing infection, are unable to compete with the original parasites, with the result that the latter remain in occupation, while the former are eliminated. However, MOSHKOVSKY rejects this interpretation. By using "marked" strains of avian malaria parasites (*i.e.* strains possessing certain recognizable peculiarities) he and his collaborators claim to have demonstrated that in the course of a superinfection the inoculated homologous parasites are not destroyed, but become established in the host, the new infection being superimposed on the old one. The host's reaction to the newly introduced parasites is the same as its reaction to those already present in its body at the given phase of the disease, and is determined by the degree of immunity already acquired. The superimposed and original infections become concomitant, the former soon reaching the clinical phase attained by the latter, and both terminating at the same time. This phenomenon was found to be the general rule in various infectious diseases (*e.g.* syphilis and malaria: human, simian and avian), and it has now been shown to occur in cutaneous leishmaniasis.

Moshkovsky then considers the bearing of his " principle " on the practice of preventive vaccination in oriental sore. In the light of the facts noted above the problem resolves itself into determining the time required for the induced lesion to run its full course. Since this varies with the human host, the locality and the strain of parasites, vaccination should be timed to bring about the final phase of the disease (scar formation) before the advent of the epidemic season.

Treatment.

In Middle Asia atebrin has been employed in the treatment of cutaneous leishmaniasis with good results [see also Flarer, this *Bulletin*, 1939, v. 36, 454]. The method, which is described in detail by Dobrotvorskaya (1941), varies according to the type and age of the lesions. In the " dry " type the early papule can be destroyed by infiltration with 5 per cent. solution of acriquine (atebrin), injected at several points. In the ulcerating phase the sore is treated by infiltration with up to 10 cc. of 3 per cent. solution of acriquine, or by application of 10 per cent. acriquine ointment, as well as with rivanol and protargol ointments. In the case of the " moist " type in the necrotic phase, the lesion is treated by acriquine infiltration and by application of yatren or rivanol poultices. It is admitted that none of these methods produces a 100 per cent. cure, though there is considerable improvement in all cases.

Bobrov (1942) advocates the application of blood-dressings in the treatment of sores of the " moist " type. The ulcers heal after 5–6 dressings applied in the course of 2–3 weeks. The total amount of blood required (and taken from the patient) varies from 50 to 100 cc.

Dubovskoy (1942) reports successful results with vaccino-therapy, using a vaccine made with killed cultures. The course consists of up to 20 intradermal injections, which produced a complete cure in 57·9 per cent. of cases treated.

Promising results have also been obtained in the treatment of oriental sore with the fruit juice of a plant of the genus *Maclura* (Moraceae) (Goussev, 1941); by transfusion of immune and normal blood (Schoulepina, 1941); and with X-rays (Smirnov & Tscherniak, 1941).

Epidemiology.

The most notable contribution to our knowledge of cutaneous leishmaniasis, made by Russian workers, was the demonstration that this disease is a typical zoonosis, *i.e.* it is essentially a disease of lower mammals which is communicable to man. The history of these investigations, most of which were carried out by Latyshev & Kriukova (1941a, 1941b, 1941d; also in Rept. Viem, 1940), is very instructive. In Middle Asia the endemic foci of the " moist " type of oriental sore are represented chiefly by rural settlements adjoining the desert, where the incidence of the disease among human beings is very high, as compared with that in cultivated areas and in urban districts. It was established that in the desert sandflies breed exclusively in the burrows of wild rodents (gerbils and sousliks). An examination of large numbers of " wild " sandflies revealed infections with leptomonad flagellates in 3·5 per cent. of the females caught in the open, and in from 6 to 35 per cent. of the insects recovered from the burrows of wild rodents, the

species concerned being *Phlebotomus papatasii* and *P. caucasicus*. There was, therefore, no doubt that the sandflies acquired their infection from some animals in the burrows, and suspicion naturally fell on the rodents to which the burrows belonged. This suspicion was fully

The Gerbil, *Rhombomys opimus*: Reservoir host of Cutaneous Leishmaniasis. (After PAVLOVSKY, 1934.)

justified, for, in the first place, when inoculated from man, 100 per cent. of the gerbils proved to be susceptible to infection with *L. tropica*; and secondly, an examination of more than a thousand wild rodents revealed natural infections with this leishmania in 30 per cent. of the gerbils *Rhombomys opimus* (see text fig.), and in a small proportion of the gerbils *Meriones erythrourus*, *M. meridianus*, and sousliks *Spermophilopsis leptodactylus*. Most of the positive animals had sores on the ears, and the infection in them lasted up to six months. Natural infections among gerbils occurred not only near the endemic foci but also far from human habitations.

The successful infection of sandflies, after feeding on naturally infected gerbils, provided further evidence (1) that these rodents were the source from which the sandflies acquired their infection, and (2) that the leptomonads found naturally in sandflies represented the developmental stages of leishmanias. Finally, the identity of the gerbil and human parasites was demonstrated by the experimental transmission of the infection from these rodents to man, and by the susceptibility of the former to infection with the human parasite, as already noted above.

It was thus proved conclusively that in the desert regions of Middle Asia naturally infected wild rodents (especially gerbils) serve as reservoir hosts of cutaneous leishmaniasis, which is transmitted to man by sandflies breeding in the burrows of these rodents. These facts also explain why the incidence of oriental sore is so high in isolated desert settlements, as well as among persons working in uninhabited desert areas. The epidemiological rôle of the rodents is further enhanced by the fact that while outbreaks of the " moist " oriental sore in man

are restricted to the aestivo-autumnal season, among gerbils the infection rate remains at a uniform level throughout the whole year. This is due, on the one hand, to the long duration of the disease and the absence of immunity in gerbils (see p. 340); and, on the other, to the fact that within the deep burrows the micro-climate is stable all the year round and corresponds to a moist subtropical climate which provides the optimum conditions for sandflies. As a result, the breeding of sandflies and the transmission of the infection to and from rodents is going on continuously in the burrows. This solves the question regarding the maintenance of the infection during interepidemic periods (LATYSCHEW & KRIUKOWA, 1941 b).

The foregoing data concern the epidemiology of the "moist" type of sore, which is prevalent in rural settlements merging with the desert. They cannot be fully applied to the conditions affecting the "dry" sore, which occurs in towns and cultivated oases. Thus, practically nothing is known regarding the reservoir hosts of the urban form of oriental sore. SHAGALOV (1942) points out that in Ashkhabad cases of oriental sore are uniformly distributed throughout the township and not chiefly on the periphery, where the desert rodents, carrying leishmanias, are found. The author suggests that the reservoir hosts in towns should be sought among domestic rodents. However, LEVINSON (1941) who examined these animals was unable to detect any infected individuals among them, though KRJUKOVA (1941) has shown that mole-rats (*Nesokia* sp.) and mice were susceptible to experimental infection with *L. tropica*. LEVINSON further records that 1 of 20 hedgehogs (*Hemiechinus albulus major*) had ear sores containing leishmanias. Since these animals live in burrows which also harbour sandflies, it is possible that hedgehogs might represent a reservoir of human cutaneous leishmaniasis in towns. The question regarding natural cutaneous leishmaniasis of dogs and of their epidemiological rôle in Middle Asia is not yet clear and stands in need of further investigation (ISSAYEV, 1941). The position is obscured because, owing to the frequent occurrence of cutaneous manifestations of kala azar, it is difficult to decide whether any particular skin lesions are due to cutaneous or visceral leishmaniasis, unless the local epidemiological situation is known. Undoubted foci of canine cutaneous leishmaniasis are found in Old Bokhara, where epidemics of the disease among human beings are accompanied by mass outbreaks among dogs. However, in Samarkand oriental sore in dogs is a rare disease, though cutaneous lesions are quite common in these animals.

The proved vectors of cutaneous leishmaniasis in Middle Asia are chiefly *Phlebotomus papatasii* and *P. caucasicus* (LATYSHEV & KRIUKOVA, 1941 a). Since the latter species occurs mainly in wild nature and rarely attacks man, while the former is essentially a domestic insect, it is probable that *P. caucasicus* is mainly responsible for keeping up the infection among the rodents in their burrows, whereas *P. papatasii* transmits the infection to man. This view is supported by the observation that the appearance of fresh human infections always coincides with the mass emergence of sandflies of the last-named species.

Some interesting experiments were conducted to determine the range of flight of these two sandflies. It was found that the distance covered by them depends upon the character of the landscape. As a rule, these insects do not fly beyond 1,500 metres (1,641 yards) over

flat country, and considerably less when there are obstructions—such as hills, water, bush, etc.—in their way.

Control.

The knowledge obtained regarding the epidemiology of cutaneous leishmaniasis ("moist" type) pointed to the poisoning of the rodent burrows as the most promising method of combating this disease under desert conditions, since it would suffice to sever two links of the epidemiological chain (*viz.* rodent+sandfly) with one stroke.

The first experiment on the liquidation of a hyperendemic focus was accordingly undertaken in 1938 at Tashkepri, in the Murgab valley, where 70 per cent. of the population were affected with Pendeh sore (Latyshev & Kriukova, 1941 a, 1941 c; also in Rept. Viem, 1940). A squad entrusted with the task poisoned over 500,000 burrows (using 3–4 gm. chloropicrin per burrow) over an area of 1,250 hectares, extending to a radius of 1,200 metres from the periphery of the built-up zone. Already shortly afterwards there was a noticeable fall in the number of sandflies and in fresh cases of human infection. When the results of the campaign were assessed thirteen months later by a special commission, it was found that sandflies had almost completely disappeared and only three fresh human cases could be detected, the incidence of oriental sore having dropped from 70 per cent. to 0·4 per cent. Thus, this campaign not only succeeded in practically eradicating a hyperendemic focus of the disease but it also served to demonstrate the correctness of the epidemiological premises upon which the experiment was based.

Animal Experiments.

Russian workers have also carried out a considerable number of experimental infections of lower mammals. In view of the discovery of reservoir hosts of the rural form of oriental sore among wild desert rodents, the object of these investigations was to detect other susceptible hosts, to ascertain whether any of them served as carriers of the urban disease, and also to study the course of infection in the lower animals. Working with gerbils (genera *Rhombomys* and *Meriones*) mole-rats (*Nesokia indica*) and domestic mice, which were inoculated from human or gerbil sores, as well as with cultures, Kriukova (1941) found that while parasites from "moist" sores produced infections in 100 per cent., those from "dry" sores succeeded in only a single gerbil. In all positive cases localized lesions only were produced. The absence of a generalized infection in gerbils was demonstrated (1) by the negative results of feeding sandflies on parts of the skin devoid of lesions, and (2) by negative heart-blood cultures. On the other hand, if allowed to feed on the sores, sandflies invariably became infected. It is interesting to note here that infection could be readily produced in gerbils through the bites of sandflies (*P. papatasii*), thus confirming their rôle as vectors of oriental sore.

Unlike man, the desert rodents (especially gerbils) do not acquire a sterilizing immunity after recovery from cutaneous leishmaniasis, for they can be repeatedly reinfected. However, the course of subsequent infections is usually milder than in the primary disease. The occurrence of reinfections or superinfections under natural conditions is evident from the fact that some of the captured gerbils had numerous cutaneous lesions in various phases of development. It was further

noted that the virulence of strains passaged for long periods of time through rodents, without the intermediary vector, was gradually reduced.

White mice can be readily infected (and reinfected) with material from " moist " sores, which produces a localized lesion at the site of dermal inoculation or implantation, with a typical clinical course, lasting from 3½ to 7 months (KOJEVNIKOV *et al.*, 1941). On rare occasions, there was also evidence of the presence of leishmanias in the internal organs (liver and spleen). ISSAYEV (1941) notes that dogs acquire typical oriental sore, when experimentally infected with *L. tropica* (see also p. 339).

Cultivation.

KRIUKOVA (1942) describes a simplified modification of the NNN medium in which fresh blood is substituted by the product of its digestion with pepsin and hydrochloric acid. The medium is prepared as follows: Physiological solution of saline 150 cc. and chemically pure hydrochloric acid (S.G. 1·19) 6 cc. are poured out into a 250 cc. glass-stoppered bottle. To this mixture are gradually added 50 cc. of defibrinated blood (rabbit, sheep or human), the fluid being thoroughly agitated all the time. When the mixture has become black, 1 gm. pepsin is added to it, after which the bottle is placed in a water bath at 50–55°C. for 3–5 hours and shaken from time to time. The bottle is then kept in an incubator at 37°C. for 1–2 days. In the foregoing process it is not necessary to take any aseptic precautions. After digestion is completed the mixture assumes a thick consistency. Finally, it is neutralized with 20 per cent. NaOH, with phenol red and cresol red as indicators (the tests can be made by placing drops of the digest on strips of filter paper which have previously been soaked in the indicators and then dried). When the reaction is *p*H 7·0–7·2, 0·5 cc. of 0·25 per cent. chloroform is added to the digest, the container is closed with a glass stopper smeared with sterile vaseline, and allowed to stand for 2–3 days. The digest is then distributed in ampoules, in which it can be preserved for more than one year. For the preparation of the medium the test-tubes with the hypotonic agar (1·5 cc. per tube) are removed from the boiler, and when their temperature is near 95°C., about 0·5 cc. of the digest is added to each tube, after which the medium is sloped and allowed to cool. Since the condensation fluid tends to evaporate, 0·5 cc. sterile 1 per cent. peptone solution can be added to each tube.

In this medium the leishmania grow readily (even in primary cultures of scanty parasites inoculated from gerbils), and are abundant by the fourth day. The use of stored digested blood simplifies the preparation of the NNN medium. Moreover, the method is very economical, for the digest can be made with blood offal.

DISCUSSION.

In the foregoing account it is shown that the Russian workers have unravelled a number of problems concerning cutaneous leishmaniasis which have hitherto remained obscure. In the first place, they have proved the existence of two nosologically independent types of oriental sore (in addition to the muco-cutaneous form); secondly, they have elucidated the mechanism of immunity in this disease; thirdly, they have demonstrated that the reservoir hosts of the infection are wild

rodents living in burrows which they share with the sandfly vector; and, finally, they have devised a successful biological method of control, based on the interdependence of the human and rodent diseases.

The work carried out in Middle Asia has a direct bearing on the position in other countries, both of the Old and the New Worlds, where the existence of different clinical forms of cutaneous leishmaniasis has also been known for a long time. In describing cutaneous leishmaniasis of the Old World the text books usually give an account of the more common ulcerating oriental sore, which is regarded as the typical form, whereas the non-ulcerating variant is considered to be atypical. Thus, LAVERAN (1917, p. 340) describes, under the heading "*Formes anormales*," non-ulcerating sores which terminate in resolution with or without retarded ulceration. The two forms are regarded by some authors as phases of the same disease, differing only in severity. If the literature on the subject is considered in the light of the Russian discoveries, it will be evident that some of the clinical forms described by earlier observers are comparable to the two types present in Middle Asia.

In discussing his own observations KOJEVNIKOV (1941 b) suggests that both types of cutaneous leishmaniasis occur in Algeria, the "dry" one in Tell, and the "moist" one in Biskra. He also thinks that in Egypt the forms described by FERGUSON & RICHARDS (1910) as the verrucous and granulomatous ("flat") forms correspond to his "moist" and "dry" types respectively. KOJEVNIKOV's conclusions can be supported by further examples. Thus, THOMSON & BALFOUR (1910) have described cases of non-ulcerating oriental sore from Khartoum which they named "Leishman nodules" and which had all the characteristics of the Russian "dry" type. In discussing the "purely cutaneous infections" in the Anglo-Egyptian Sudan, KIRK (1942) also recognizes the existence of two clinical types. One is the ulcerating oriental sore, which is the common form in that country and corresponds to the Russian "moist" type. The other is represented by the non-ulcerating "Leishman nodules" described by THOMSON & BALFOUR but not encountered by KIRK himself. As noted above, the latter form can be identified with the "dry" type. Instances of non-ulcerating or "dry" sore, in addition to the typical or "moist" oriental sore, have also been reported from India (CARTER, 1911) and from Greece (*fide* BRUMPT, 1936). MANSON (1917) stated that in Bagdad the disease sometimes recurs more than once in the same individual, but, as a rule, "the sores of the second attack do not break down." Since a single attack of oriental sore affords protection against reinfection with the homologous form but not against a heterologous sore, it is probable that in these cases there was a primary infection with a "moist" sore followed by reinfection with a "dry" sore. MANSON also notes that in some instances the initial papule does not ulcerate (="dry" type).

The conditions in the New World appear to be very similar to those in the Old World. According to PEÑA CHAVARRÍA (1937) in Costa Rica there occur two main clinical types of cutaneous leishmaniasis—ulcerating and non-ulcerating—each with two variants. From his description it would seem that the non-ulcerating nodular form (and possibly also his verrucose form) is identical with the "dry" type, while the ulcerating cutaneous form corresponds to the "moist" type, or oriental sore *sensu stricto*. As regards the remaining Central American form, "ulcerosa cutaneo-mucosa," this is similar to South

American " espundia," on the one hand, and to the muco-cutaneous form found in the Anglo-Egyptian Sudan (KIRK, 1942), on the other.

As regards the aetiological basis for the differentiation of the clinical forms of cutaneous leishmaniasis, some authors (*e.g.* PEÑA CHAVARRÍA) believe that environmental conditions under which the host lives determine the type of the disease produced, while others (*e.g.* KIRK) think that the type of infection depends upon the strain of parasite involved : different strains vary in virulence and in the degree of adaptation to the human host. If the latter supposition is correct, it would follow that strains of *L. tropica*, differing in their effect upon the host, represent true biological races, comparable to those occurring among other pathogenic blood protozoa (*cf.* HOARE, 1943).

The question regarding reservoir hosts of oriental sore does not seem to have been dealt with outside Middle Asia. A search for carriers among the wild burrowing rodents in other endemic regions might, therefore, yield promising results. In this connexion it is interesting to note that it has been demonstrated that some North African wild rodents are susceptible to infection with leishmanias. Thus, ARCHIBALD (1914) infected gerbils (*Gerbillus pygargus*) and jerboas (*Jerboa gordoni*) with a Sudanese strain of *L. donovani*, while LAVERAN (1917) reported the successful infection of gerbils (*Meriones shawi* and *Gerbillus hirtipes*) with a Tunisian strain of *L. tropica*. Quite recently BLANC *et al.* (1942 a, 1942 b) have experimentally infected the " spiny squirrel " (=ground squirrel), *Xerus* (*Atlantoxerus*) *getulus*, with *L. tropica* and *L. donovani*, while NATTAN-LARRIER *et al.* (1940, 1942) infected the gerbil, *Meriones shawi*, with the last-named parasite. It is significant that the environmental conditions and habits of these North African rodents are the same as those of the rodents which are proved carriers of oriental sore in Middle Asia, and that the two groups of rodents are also closely related zoologically. However, with the exception of LAVERAN, none of the above mentioned observers has considered the bearing of these experiments upon the epidemiology of leishmaniases. As regards LAVERAN, he thought it was highly improbable that gerbils could serve as reservoir hosts of leishmaniasis, since these animals have never been found naturally infected.

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SUMMARY OF RECENT ABSTRACTS.*

IV. TRYPANOSOMIASIS.

African Trypanosomiasis.

Epidemiology: Transmission.

Durén and Lejeune (p. 224) have noted the incidence of trypanosomiasis in Government officials of the Belgian Congo since 1908. Incidence in the medical staff has been much higher than in others.

van Hoof *et al.* (p. 367) have shown that the domestic pig is an effective reservoir of *Trypanosoma gambiense* in the Belgian Congo. The trypanosome remains pathogenic for man after 10 cyclical passages in pigs; the infected pigs remain without symptoms for prolonged periods and few trypanosomes are found in the blood, but the animals remain infective for a year or more; transmissibility of the trypanosome is gradually reduced, as a rule, during cyclical transmission; the infection tends towards spontaneous cure, but the pigs can be reinfected.

van Hoof *et al.* (p. 368) have investigated the irregularities which occur in the transmission of *T. gambiense* by *Glossina palpalis*. If the strain is taking well in a guineapig, each bite causes infection, but in less well adapted strains, failures occur. These failures increase when the infective flies are fed on animals which have been treated with Bayer 205, even after a long interval. A fly, after infecting an animal, may become cleared of all flagellates. Transient refractory states undoubtedly occur in certain vertebrates. Irregularity may be due to delay in the completion of the cycle of the parasite in the fly. The infective capacity of the trypanosome for the guineapig may be altered, or even suppressed, by prolonged sojourn in a patient; this may be partly the result of treatment, but has been observed under conditions of slow development, when drug treatment could not be a factor. Loss of virulence in flies infected from pigs, which show few signs of disease, is marked.

In part of the French Cameroons in which sleeping sickness is found, Campourcy (p. 18) reports infection rates of only 2·6–4·65 per cent. in *Glossina palpalis*. In other districts no infected flies were found, though the human disease was present.

Burtt (p. 369), during the course of experiments on the ability of *Glossina brevipalpis* to transmit *T. rhodesiense*, dissected a large number of the flies caught near Amani, Tanganyika Territory. Polymorphic trypanosomes were found in the salivary glands in 0·32–1·04 per cent. in the various areas, but the author deliberately omitted to attach any specific name to them, "for there are few, if any, parts of Tanganyika where the indigenous *T. brucei* has not by this time had a chance of contamination with *T. rhodesiense*. The Sigi trypanosome [Sigi was part of the area surveyed] was very probably *T. brucei*, but proof of this identity has not been obtained." Most of the gland

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1943, v. 40. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

infections were very heavy, and the author gives a description of certain characteristic naked eye and microscopic appearances of infected glands.

FERREIRA (p. 524) reports trypanosomiasis in north-west Mozambique; in the original paper is given a map showing the distribution of *Glossina* in that country.

Clinical Findings.

DAVID and PAPE (p. 19) report from the French Cameroons two cases of congenital trypanosomiasis. They claim that these are the first in which transplacental transmission has been established without doubt. Trypanosomes were found in the infants, and in the umbilical cords, immediately after delivery.

CECCALDI (p. 887) refers to the great tolerance of human trypanosomes [presumably *T. gambiense*] sometimes exhibited by African natives, and mentions three cases in which the infection apparently persisted for 8–12 years. He discusses the question of persisting chronic or inapparent infection, or of reinfection, without, however, arriving at a conclusion.

TROLLI and VAN WYMEERSCH (p. 18) contend that examination of a thick blood smear is a more effective diagnostic measure than gland puncture in the diagnosis of *T. gambiense* infections. [Nevertheless a considerable proportion of those with positive gland puncture material appear to have given negative blood smears, and in a discussion of this paper RODHAIN points out that single blood test may reveal only two-thirds of the actual positive cases. See also LAWSON, below.]

RODHAIN *et al.* (p. 120) have used an antigen from *T. equiperdum* in a complement fixation test for human trypanosomal meningo-encephalitis (*T. gambiense*). In three cases the blood was positive; in two the cerebrospinal fluid. The latter became negative after treatment.

Treatment.

LAWSON (p. 224) has made a close test of the value of pentamidine in the treatment of 53 cases of sleeping sickness due to *T. gambiense* in the West Nile district of Uganda. The cases were not selected. Extensive blood, gland puncture and cerebrospinal fluid examinations were made before, during and after the treatment. Diagnosis was made in most cases by examination of gland juice; blood examination was positive in only a small minority of cases. Pentamidine was given daily by the intravenous route in doses of 0·1 gm. for patients over the age of 10 years; those aged 6–10 were given half doses. Most of the patients received 10 injections. Examination 2–3 months later showed that 41 patients were clinically cured, 7 improved, 4 unchanged or worse, and 1 was dead. Of patients with moderately raised cell counts in the cerebrospinal fluid, most were improved by the treatment, but in those with higher counts the results were not so good. Toxic reactions comprised increase in pulse rate, itching, nausea, vertigo and shivering; in a few there was a slight fall in systolic blood pressure. One man collapsed, but recovered quickly. These effects were all transient. The author concludes that pentamidine sterilizes the blood rapidly, and in view of the shortness of the course of treatment, considers it probably the best drug so far produced

for early cases. If the cerebrospinal cell count is over 80, however, it is probably safer to use a pentavalent arsenical. In comment YORKE (who had introduced this group of drugs in the treatment of protozoal infections) pointed out the need for a longer period of observation before arriving at definite conclusions.

LOURIE (p. 370) reports on a therapeutic trial of certain aromatic diamidines in *T. gambiense* infections in Sierra Leone. He concludes that in early cases the curative properties of pentamidine and propamidine are no less than those of tryparsamide, whether the latter is given alone or preceded by antrypol. Stilbamidine is of considerably less value. In late cases tryparsamide is much more effective than these diamidines. The toxic effects of the diamidines are immediate, and the outstanding feature is the sudden and severe, but transient, fall in blood pressure, which is accompanied by faintness and various subjective symptoms. No late toxic effects were seen, but the author notes that other workers, using heavier doses, have reported late disturbances of a serious nature. The diamidines were given intravenously (except in a few cases when the intramuscular route was used) in doses of 50–100 mgm. daily for 8–12 days for adults. To some patients they were given at 5-day intervals, but there is advantage in daily administration.

GILBERT (p. 589) has treated 14 cases of *T. gambiense* infection with pentamidine. He suggests that two courses of 8 injections, one each day, of at least 2·0 mgm. per kgm. body weight, preferably intravenously, separated by an interval of one week, might be highly effective except in patients verging on coma.

FULTON and YORKE (p. 19) have investigated the trypanocidal action of two more aromatic diamidines.

LOURIE (p. 370) writes of the results of treatment of *T. gambiense* infections with antrypol and tryparsamide. Various toxic effects are recorded, and it is the opinion of the author that in the aetiology of these the poor nutritional state of the patients was an important factor. High incidence of toxic reactions, with some deaths, was seen in patients treated with antrypol followed by tryparsamide, all doses being given at intervals of five days. When a long interval, of 5–7 weeks, was allowed to elapse after the first or second dose, the remainder being given at 5-day intervals, the toxic effects were much reduced. The toxic symptoms are set out in detail.

MCDERMOTT *et al.* (679) have investigated the relation, in rats, between nutritional degeneration of the optic nerve and tryparsamide amblyopia. Degeneration occurs in rats fed on a basic diet deficient in vitamin A or parts of the vitamin B complex, whether tryparsamide is given or not, but is rather more marked in those given tryparsamide. It seems probable that the parts of the vitamin B complex which protect the nerve are pantothenic acid and pyridoxine.

KING and STRANGEWAYS (p. 20) have reported on the relation between chemical structure and drug resistance among certain arsenicals. The work was done *in vitro* with normal and tryparsamide-resistant *T. rhodesiense*, but cannot be further abstracted.

ROSENTHAL (p. 589) has shown that mapharsen is trypanocidal when given by mouth to mice infected with *T. equiperdum*, and that when given with glutathione (to diminish toxicity) the chemotherapeutic index (max. tol. dose/curative dose) was considerably higher than when given intravenously.

Dubois and Kohn (p. 294) show that methylene blue and certain other substances, when injected into mice infected with trypanosomes, interfere with the therapeutic action of subsequently injected neoarsphenamine.

In an old, but still active, focus of sleeping sickness in the Belgian Congo, where new cases in 1942 numbered 3·69 per cent. of the population, Fain (p. 373) administered to almost every member of the community a dose of Belganyl (the equivalent of Bayer 205) amounting to 0·025 gm. per kgm. body weight, as a prophylactic. These injections produced toxic effects, some of which were by no means negligible, in a proportion of cases. The author describes the toxic effects which occurred within a few hours, within a few days (the chief being albuminuria with or without casts and red cells), and later. The prophylactic effect was measured by examination of the population at three-monthly intervals up to nine months after injection; 12 new cases were found (there had been 162 new cases in the previous year). It is concluded that the disadvantages of toxicity are compensated by the real advantage from the prophylactic effect in heavily infected communities.

Dubois & Kohn (p. 19) have tested the infectivity of *T. brucei* in animals after treatment with Bayer 205 and other drugs; the infectivity was tested before the trypanosomes disappeared from the blood. Bayer 205 rendered them non-infective [as is well known], but arsenicals, tartar emetic and human serum usually failed to do so. In comment Hawking points out that this is probably because the trypanosomes were tested for infectivity in the period between fixation of the drugs and actual death.

Control.

Vaucel (p. 586) traces the history of sleeping sickness in the French Cameroons. The disease was recognized in 1899, but control on a large scale was not undertaken until 1920. In 1922 the incidence in a population of three-quarters of a million was 17·2 per cent., but in some areas the infection rate was much higher, even up to 90 per cent. Control has been attempted, with great success, by chemotherapy, but the author notes that in some areas this medical treatment encountered resistance, checks, and revivals of infection which are apparently inexplicable. He has received the impression that marked success is achieved in the spreading zones, and checks are met in old endemic foci situated in swampy riverine areas infested with tsetse. During the last 10 years the incidence of new cases has remained almost constant, but at a low level, and it appears to be impossible to progress further by these means; chemotherapy apparently cannot eradicate trypanosomiasis. The explanation of this may be that certain races of tsetse may be especially effective, or that there may be particularly virulent trypanosomes; he thinks that drug-resistance is probably not an important factor. The author advocates stronger administrative measures and discusses the breaking of contact between man and fly by settlement of the people and destruction of tsetse; the economic and social development of the country must be raised as part of the trypanosomiasis control scheme.

Muraz (p. 524) discusses the results achieved in French West Africa by a control scheme in which medical supervision and treatment were supplemented by agricultural measures (bush clearing followed by

cultivation). This programme gave results much better than those which followed chemotherapy and chemoprophylaxis alone. [The details were discussed in previous papers, which have not, however, been received.]

LEWIS (pp. 293, 294) discusses the relation between tsetse and land development in Kenya. Fly infestation is irregular, but most species depend on water, so that the infested areas are along the rivers or near water holes. Animal trypanosomiasis has led to concentration of stock in clear areas, and control of other diseases has effected an increase of stock, with overcrowding and consequent soil erosion. Spread of the fly may occur along traffic routes, and for control these should be arranged so as to avoid spread as far as possible. Watering places and road crossings should be kept free from fly, dry season areas of fly concentration should be attacked, trapping of fly and destruction of wild animals should be carried out. By controlled cultivation more land can be brought into use, and can be freed from fly so that stock can be reintroduced.

LEWIS (p. 678) notes that in Kenya the ruthless clearing of bush is now regarded as too drastic and costly a means of controlling tsetse, and that the clearing of barriers is sufficient to prevent extension, and can be used to isolate blocks of infested country in which the tsetse can be dealt with by other methods. Game reduction, very satisfactory in S. Rhodesia, may not be so effective against species which are not so well adapted to game as is *G. morsitans*.

MACAULAY (p. 885) gives an account of a tsetse fly and trypanosomiasis survey of Bechuanaland, which was carried out in 1940–42. The survey was concerned chiefly with trypanosomiasis of cattle, but the investigations into the biology of the only vector found, *Glossina morsitans*, are important in relation to human sleeping sickness, which also occurs in the area. Catches of *G. morsitans* were always highest where the vegetation was thickest, especially in thicket with canopy. Breeding takes place in the forest fringes; the semi-arid open conditions lead to desiccation and are unsuitable to the fly. Destruction of breeding areas (which can be defined by aerial photography) was undertaken by cutting small trees and low branches, and by burning when they were dry; the results were good. The fly population did not appear to be related to rainfall or to maximum, minimum or mean temperature. The vegetative fringes to swamps, in which the humidity is adequate, provide the shelter necessary to the fly, and game is becoming more abundant. The control measures recommended include the selection of grazing grounds and their maintenance, the settling of families along the edge of all danger areas, the exclusion of game by the erection of thorn bush fences, thicket control, the use of traps, and clearing work. Human sleeping sickness has broken out again in one area, and it is advised that a sleeping sickness patrol be established, that the inhabitants of certain villages be transferred to fly-free areas, and that bush clearing be carried out.

CHORLEY (p. 588) shows that native cattle have continued to increase in the areas of Southern Rhodesia rendered free of tsetse, and that during 1941 over 20,000 game animals were destroyed as part of the control programme. The position in the restocked areas appears to be satisfactory, but there has been an extension of *G. morsitans* from Portuguese territory towards the Rhodesian border, with resulting outbreaks of cattle trypanosomiasis.

Chagas's Disease.

Epidemiology: *Transmission.*

Davis *et al.* (p. 590) have proved that *Triatoma sanguisuga* and *T. ambigua* are natural carriers of *Trypanosoma cruzi* in Texas; a list of the other six proved vectors in that State is given. Packchanian (p. 526) has found certain animals—armadillo, opossum, mouse and wood rat—naturally infected with *T. cruzi* in Texas.

Wood (p. 525) has determined that *T. cruzi* may be found viable in bugs as long as 15 days after the death of the bugs. He notes that the rodents which harbour *T. cruzi* are all entomophagous and can probably become infected by eating dead infected bugs.

Torrealba (p. 680) reports a very high incidence of Chagas's disease in part of Venezuela, where *Rhodnius prolixus* is the vector. He has found the horned Capuchin monkey (*Cebus apella*) infected in nature.

Otálora (p. 759) reports that Chagas's disease is fairly common in Colombia, especially in the poorer people. He regards the xenodiagnostic test as the most reliable and states that it is not difficult to carry out.

Mazza (pp. 525, 761) and Viana Martins and Macedo (p. 761) contribute information on various bugs found infected in Bolivia. Although infected Triatomid bugs have been found in Bolivia, human or mammalian disease has not hitherto been seen. Mazza and Chacon (p. 888) have now found infection in one child and one dog, and suspect that the distribution of the disease must be fairly wide.

Gasic and Carvajal (p. 760) describe the clinical findings in acute and chronic Chagas's disease. The latter is difficult to diagnose, but xenodiagnosis and the Machado reaction may help. Incidence is high in Chile, judged by the results of the Machado test in sera collected from large numbers of people, but the disease appears to be less severe on the Pacific than on the Atlantic side of South America. *Triatoma infestans* is the vector, and the principal reservoirs are dogs and cats.

Gasic (p. 888) repeats the view that Chagas's disease appears to be milder in Chile than in the Atlantic countries of S. America. He describes the clinical types. The infection has been found in dogs and cats, but other animals examined have proved negative.

Pathology: *Immunity*: *Clinical Findings.*

Collier *et al.* (p. 21) have studied the phases of *T. cruzi* infection of mice. After a negative blood phase there occurs progressive infection followed by the occurrence of acute pathological changes. At this stage oedema is found over the body and along fascial planes. The exudate from this oedema may contain more trypanosomes than the peripheral blood. A detailed description of the oedema is given, and it is noted that it may spread through and separate the voluntary muscle fibres and that the myocardium may show similar changes. The thyroid remains normal. In mice which showed the acute pathological changes the leishmanial forms of the parasite could be found in heart and other organs, but not in the thyroid. The oedema, therefore, is not myxoedematous, but is probably inflammatory. Subsequently, in mice which survive, the oedema disappears and the blood infection fades. Oedema does not occur in other trypanosomal infections of mice, nor in animals other than man, dog and mouse, infected by *T. cruzi*.

Senekji (p. 681) has immunized rabbits by injection of killed culture forms followed by injections of living trypanosomes. Agglutinins and lysins for *T. cruzi* were demonstrated in the serum of these animals and intradermal injection of cultures produced in them reactions which reached their maximum in 24 hours. The author concludes that the slide agglutination test affords a simple method for the diagnosis of experimental *T. cruzi* infections in animals.

Denison (p. 681) has demonstrated that serum of rats which have recovered from *T. cruzi* infection will lyse culture forms of the trypanosome. Serum from uninfected animals in which the reticulo-endothelial system has been blocked with trypan blue also causes lysis, but much more slowly.

Mazza *et al.* (p. 226) reports that early diagnosis of Chagas's disease can be made by examination of excised lymphatic glands, in which leishmania forms of *T. cruzi* can be found. Adenitis is associated with three stages of the disease: local to the site of primary infection (inoculation chagoma); satellite lymphatic dissemination around the primary lesion (metastatic chagomata); generalization (haematogenous chagomata). The authors describe the histological findings. Versiani and Junqueira (p. 890) support this classification, and state that if blood examination is negative, biopsy of enlarged glands provides the readiest means of diagnosis of Chagas's disease. In the regional glands leishmania forms of the parasite may be found, and the histological appearances are characteristic. Adenitis is seen first in the glands draining the area of infection, then in satellite glands, and finally in glands elsewhere after generalization of the infection.

Iriarte (p. 375) has had disappointing results, in Chagas's disease, with attempts at diagnosis by the xenodiagnostic method and by the Machado-Guerreiro test. He states that the latter is a group test which is given also by leishmanial infections common in Venezuela.

Davis (p. 890) describes the preparation of an antigen from *T. cruzi* for use in a complement fixation test in Chagas's disease.

Alvayay and Carvajal (p. 761) have described the cardiac abnormalities which may be found in Chagas's disease; the paper cannot satisfactorily be abstracted, but sinus arrhythmia, arrhythmia with tachycardia, tachycardia of sinus origin, and bradycardia are mentioned.

Mazza *et al.* (p. 22) describe the action of the two Bayer preparations known as 7602 (Ac) and 9736 (As) in cases of Chagas's disease. The former is more effective, but more toxic *Charles Wilcocks.*

MALARIA.

Mazzeo, M. & Sementini, A. Endemia malarica ed anofelismo in una località del Napoletano (Mondragone). [**Endemic Malaria and Anophelism in a Neapolitan District (Mondragone).**] *Riv. di Malariologia.* Sez. I. 1942, v. 21, 155–76. [Translation of abstract by Dieterlen from *Zent. f. Bakt.* I. Abt. Ref. 1943, June 18, v. 143 No. 15/16, 309.]

The authors report on the species and races of anophelines found in the town and district of Mondragone in the Province of Naples. *A. maculipennis* var. *messeae, melanoon* and *atroparvus* are the predominant species met with near dwellings and stables. In the swampy

districts a few *elutus* are found and, here and there, *labranchiae*; in the spring and autumn *typicus* is met with. The authors discuss the present position and the sanitary construction work done and recall the severe malaria epidemics of former times; they show how the houses are protected today by a ring of stables well filled with oxen, and how the hygienic conditions have greatly improved. They believe that the improvements already made and those still to be made will exert a further favourable influence. *J. F. Corson.*

Petazzi, A. L'endemia malarica a Durazzo nel 1941. [**Endemic Malaria at Durazzo in 1941.**] *Riv. di Malariologia.* Sez. I. 1942, v. 21, 177–97. [Translation of abstract by Dieterlen from *Zent. f. Bakt.* I. Abt. Ref. 1943, June 18, v. 143, No. 15/16, 309.]

After describing the antimalarial measures carried out in the area of Durazzo in 1941, the author reports on the work of the Malaria Station in Durazzo (a branch of the Malaria Institute E. Marchiafava in Rome) during 1941. Besides the study of endemic malaria, meteorological observations were made, the occurrence of *Anopheles* studied and spleen indices determined. The presence of *A. elutus* (the most dangerous carrier), *A. maculipennis typicus* and *messeae*, *A. bifurcatus*, *A. superpictus*, and *A. hyrcanus pseudopictus* was shown. Observations on endemic malaria have shown a large decrease in the number of cases compared with 1940; the decrease affected chiefly *P. falciparum* infections and was connected with increased salinity of the lagoon waters, diminished rainfall, and small numbers of labourers and soldiers living in Durazzo and the neighbourhood during 1941. The Albanians were infected with *P. falciparum* to a greater extent than the Italians. *J. F. Corson.*

Coluzzi, A. L'endemia malarica a Valona. Nota II. [**Endemic Malaria at Valona.**] *Riv. di Malariologia.* Sez. I. 1942, v. 21, 198–214. [Translation of abstract by Dieterlen from *Zent. f. Bakt.* I. Abt. Ref. 1943, June 18, v. 143, No. 15/16, 309.]

The seasonal epidemic of 1941 at Valona began in the middle of June and lasted until the end of October; the first cases of benign tertian appeared in the third week of June and the first cases of malignant tertian occurred in the first week of July. Compared with 1940 the infections have decreased in number by about 50 per cent.; the spleen index has decreased by about 10 per cent. As already pointed out, after the drying up of the swamps the springs and streams remain as breeding places of Anopheles. Larvae of *A. maculipennis typicus* and *A. elutus* were found. Besides the treatment of cases of malaria, antimosquito measures—by Paris green, oiling, small sanitation works and drainage—are used, measures which have certainly contributed to the decrease of malaria. *J. F. Corson.*

Coluzzi, A. Osservazioni sulla malaria dell' Epiro (Grecia). [**Observations on Malaria in Epirus (Greece).**] *Riv. di Malariologia.* Sez. I. 1942, v. 21, 96–108. [Translation of abstract by Dieterlen from *Zent. f. Bakt.* I. Abt. Ref. 1943, June 18, v. 143, No. 15/16, 308.]

After a short description of the geographical, climatic and demographic features of Epirus, the author reports on the epidemiological conditions

there in November 1941. He records the spleen index of the chief places and, from personal observations, gives a general view of the malaria position in Epirus. Malaria is very widespread especially along the coast, rivers and streams, near the lakes, and in the swampy areas up to 500 metres above sea level. The commonest malaria vectors are: *A. elutus*, *A. superpictus* and *A. maculipennis*. The epidemic season extends from June to the end of October, with local fluctuations according to the breeding of the anopheline carriers. All three forms of malarial infection, *P. vivax*, *P. falciparum* and *P. malariae*, are present. Blackwater fever is rare. There is urgent need to carry out antimalarial (antilarval) sanitary measures, to treat the sick properly and promptly, and to offer good protection to the traveller visiting the country. *J. F. Corson.*

PERVES, M. Observations de paludisme héréditaire et congénital. Quelques considérations sur la croissance des nourrissons dans la tribu Maka (région du Haut-Nyong, Cameroun). [**Hereditary and Congenital Malaria. The Growth of Infants of the Maka Tribe in the Upper Nyong Region of the Cameroons.**] *Rev. Sci. Méd. Pharm. et Vét. de l'Afrique Française Libre.* 1943, Mar., v. 2, No. 2, 107–18, 1 chart.

The observations recorded in this paper were made in the Abong-M'Bang subdivision of the Upper Nyong region of the Cameroons; Abong-M'Bang is an immense saucer-shaped, swampy, wooded depression, some 800 metres above sea level, from which the large Nyong River takes its source. It has long been an extremely unhealthy region with a declining population. Twenty years ago trypanosomiasis was possibly the most potent cause of morbidity and death. Today malaria is public enemy number one, though other conditions contribute to the decline of the population. Gonorrhoea is an important cause of sterility. Alcoholism, drug addiction, under-nourishment and over-recruitment of labour are important factors.

The author believes hereditary malaria to be quite common. Examination was made of the liver, spleen and sternal bone-marrow of four stillborn infants. *P. falciparum* was found in the spleen of three and in the bone-marrow of one. Only one of the four infants was free of malaria. In one of the positive cases rosettes and gametocytes were seen. The cause of death of the three infected infants was complicated or difficult labour.

A distinction is made between congenital and hereditary malaria, the former being reserved for cases in which infection is transmitted from mother to infant at the time of birth as a result of placental damage. Among 661 infants examined soon after birth *P. falciparum* was found in the umbilical cord of 46 and in the finger blood of 17. Of 651 mothers examined *P. falciparum* was found in the finger blood of 211 and in the umbilical cord of 78. [The author does not suggest any explanation for the difference in the results of examination of the blood of the umbilical cord of infants and mothers respectively immediately after birth.]

Each baby is supplied with an individual card on which are recorded monthly its weight, the results of blood examination and notes of any disease. A study of these cards indicates that under four months of age parasitaemia and splenic enlargement are both exceptional. From

the fourth to the sixth month one infant in three has an enlarged spleen and one in four harbours plasmodia. Thereafter both indices increase and remain at a very high level till 18 months of age, after which there begins a slight diminution. The results show that 94 per cent. of infants are infected with malaria. The rate of growth of infants is satisfactory up to the third month ; thereafter it lessens and is much below normal during the second six months of life.

Norman White.

Simmons, J. S. **Global Malaria.** *New England J. of Med.* 1943, Oct. 14, v. 229, No. 16, 605–10, 3 figs.

The geographical distribution of malaria is briefly outlined and reference is made to the most important of the anopheline vectors in various parts of the world. A graph illustrates the annual admission and death rates for malaria in the United States Army from 1819 to 1941 ; this shows the remarkable decline in incidence of malaria since 1900. In 1939 the malaria admission rate for the army at home and abroad was only 3·8 per thousand. In 1940 the malaria control programme was greatly expanded. An enormous mosquito control programme was carried out in the United States in 1941 at the cost of 2 million dollars. The malaria admission rate in that year fell to 1·7 per 1,000. In 1942 the campaign was intensified, 3 million dollars being spent. The malaria rate in that year fell to 0·6 per 1,000, much the lowest rate ever recorded. U.S. troops are operating in some very malarious areas, but in no theatre of war was the admission rate in 1942 above 173 per 1,000, and it is believed that even in these areas the situation will improve with the more extensive field use of the new insecticides and repellents. Generally speaking the health of U.S. soldiers everywhere had been excellent.

Incidentally, the author issues a warning against the misleading and false rumours, derogatory to atabrine, that have been circulated ; the Army was glad that it had adequate supplies of that drug.

Norman White.

Sisk, W. N. **Post-War Malaria Prevention by the County Health Department.** *Amer. J. Pub. Health.* 1943, Nov., v. 33, No. 11, 1343–6.

The author, who is the Medical Director of the Buncombe Board of Health, Asheville, N.C., has already had 42 cases of malaria among troops invalided to military hospitals in his County. This part of North Carolina is not malarious, though 10 cases are known to have been contracted locally several years ago. *A. quadrimaculatus* breeds in creeks and lakes near the largest of the Army hospitals. An anopheline survey has been undertaken. The Anopheles breeding season is limited from the latter half of June to the end of September. Oiling and varying the water level of small lakes are among the measures used to control mosquito breeding. In view of the certainty of the importation of malaria among returning troops during and after the war to all parts of the United States, it is expedient that all health authorities should carry out surveys to determine the malaria transmission potentialities of their districts. In doing so expert help and guidance can be obtained from the U.S. Public Health Service. *Norman White.*

RUSSELL, P. F. **Malaria and its Influence on World Health.** *Bull. New York Acad. Med.* 1943, Sept., v. 19, No. 9, 599–630. [40 refs.]

This is the Hermann M. Biggs Memorial Lecture. A summary is impossible, for the lecture gives in relatively small space a remarkably complete history of malaria from early times up to date. The story is well told. It ends in directing attention to the fact that in spite of potent weapons for treatment and control malaria remains uncontrolled over large stretches of the earth's surface. Malaria control is still a feeble effort. *Norman White.*

SAGEL, W. Beitrag zur Beantwortung der Frage nach der E-Stadium-Sporozoitentheorie der Malaria mit Hilfe von biologischen Leukozytenkurven und von Hämogramm-Analysen. [**The Leucocyte Curve and Haemogram in relation to the Endothelial Stage of Malaria Parasites.**] *Deut. Tropenmed. Ztschr.* 1943, Aug. 1, v. 47, No. 15/16, 377–99, 7 figs.

The author describes observations he has made on the leucocytes of patients with mental disease who had been treated by induced malaria. He finds that the blood changes of cases in which the malaria was produced by mosquito bites differed from those of cases resulting from the inoculation of infected blood. He claims that soon after the injection of sporozoites by the mosquito the blood picture shows a monocytosis which does not occur in inoculative malaria. This difference is due to a stimulation of the reticulo-endothelial cells by the sporozoites. The author's conclusion, supported by numerous tables and charts and much detailed discussion, is that there is justification for the assumption that in human malaria sporozoites enter cells of the reticulo-endothelial system, and there give rise to an exoerythrocytic phase of development. *C. M. Wenyon.*

VARGAS, L. El " Grupo *maculipennis* " del nuevo mundo y el *Anopheles earlei*. [**The *maculipennis* Group of the New World and *A. earlei*.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1943, Sept., v. 4, No. 3, 279–84, 4 figs. English summary.

" *Anopheles* of the New World belonging to the so-called *maculipennis* group are *atropos* Dyar & Knab, 1906; *aztecus* Hoffmann, 1935; *earlei* Vargas, 1943; *freeborni* Aitken, 1935; *occidentalis* Dyer & Knab, 1906; *quadrimaculatus* Say, 1824 and *walkeri* Theobald, 1901. They must be dealt with as species, discarding the specific name *maculipennis* as it does not include *atropos*, *walkeri*, *quadrimaculatus* and *earlei*. We lack enough information on the components of the group but especially on *occidentalis* and *earlei*. The author presents some characters of larvae, pupae, females and male terminaliae. Some data on other *Anopheles* are mentioned."

VARGAS, L. Clave para identificar las larvas de Anopheles mexicanos. [**Key to the Mexican Anophelines.**] *Ciencia.* Mexico. 1940, Apr. 1, v. 1, No. 2, 66–8.

PRATT, H. D. **The Identification of First Stage Larvae of Puerto Rican *Anopheles*.** *Pub. Health Rep.* Wash. 1943, Nov. 19, v. 58, No. 47, 1715–17, 1 fig.

ALVAREZ ALEMÁN (Leopoldo). Lesiones histo-patológicas del cerebro y el cerebelo en el paludismo pernicioso. Ensayo patogénico. [**Histopathology of the Cerebrum and Cerebellum in Pernicious Malaria.**] *Mem. d. V Congr. Méd. Centro-americano, San Salvador, 5–12 Nov., 1938.* pp. 379–393. With 14 figs.

i. HUGHES, S. B. & BOMFORD, R. R. **Clinical Features and Treatment of Malaria in British Troops in West Africa.** *Brit. Med. J.* 1944, Jan. 15, 69–73. [18 refs.]

ii. BRITISH MED. J. 1944, Jan. 15, 84–5. **Malaria among Troops in West Africa.**

i. This admirable account of the clinical features of malaria in West Africa is based on over 1,200 cases seen in two military hospitals. The patients were white males aged 18 to 51 who had been passed fit for oversea service and who, for the most part, were here exposed to malaria infection for the first time. The observance of antimalaria precautions, and the taking of a suppressive drug, were enforced. Nearly all, if not all, infections were due to *P. falciparum*. Subtertian malaria is hyperendemic and transmission may occur at any season; *A. gambiae*, *A. gambiae* var. *melas* and *A. funestus* are the vectors.

Of 846 unselected cases 684 were of the febrile type; 83 of the gastro-intestinal type (gastric 11, diarrhoeic 60, dysenteric 12); 39 of the respiratory type; 10 of the myalgic type; 2 of the cerebral type. Twenty-four cases were non-febrile, the patients suffering only from headache and slight malaise; four others had jaundice.

In the febrile type fever is the main feature. The sudden onset was attended by chilly feelings or shivering but rigors were observed on only 22 occasions. Rigors should suggest the possibility of the onset of blackwater fever and necessitate a close watch on the patient and his urine. Vomiting occurred in about a third of these patients in the febrile stage and in some cases it was very distressing.

In the gastric form vomiting was the principal feature and the fever was mild: some of the patients were sent to hospital with a diagnosis of dyspepsia or acute gastritis. In the diarrhoeic form, simple diarrhoea with colicky pain was the predominant symptom; none of these patients had high fever and 11 of them had no fever at all while in hospital. No organisms of pathogenic significance were found in the stools. Diarrhoea with blood and mucus in the stools characterized the dysenteric form; culture of the stools never revealed the presence of pathogenic organisms. The symptoms, as in all other forms, readily yielded to specific malaria therapy.

Symptoms of an acute or subacute bronchitis characterized cases of the respiratory type. Some fever was the rule but in a few cases it was insignificant or absent.

Muscular pain and stiffness were the main features of the ten cases of the myalgic type; in six there was no fever.

Both cases of the cerebral type recovered. One of the patients was gravely ill, with delirium, a paralytic squint and a left extensor plantar response.

Four patients subsequently developed blackwater fever and two of them died.

Less than 10 per cent. of the patients could be described as severely ill and less than 1 per cent. as dangerously ill. Most of those severely ill were patients who responded unusually slowly to anti-malaria

drugs. Only 2·4 per cent. of the patients were invalided home. The authors consider that—given favourable conditions—malaria in West Africa at the present time need not enjoy the evil reputation that it has had. Wherever possible patients should be treated in hospital and be kept there for at least 12 to 14 days. The provision of convalescent camps might further reduce disability from malaria.

In the beginning patients were treated with a full course of quinine, mepacrine and pamaquin. The assumption that this would lessen the relapse rate was not justified by events. Then patients in one ward were treated with quinine followed by pamaquin; those in another with mepacrine followed by pamaquin. The quinine patients responded more quickly to treatment but return cases were somewhat fewer in the mepacrine-pamaquin ward. Subsequently the use of pamaquin was abandoned; the destruction of gametocytes in these patients was of little practical value where there was so large a reservoir of infection in the native population. Finally, the routine treatment was by the administration of a quinine salt in solution by mouth, 10 grains three times a day, for two days; this period was extended to three days if the patient's temperature had not fallen below 100°F. at the end of 48 hours. During the subsequent six days, 0·1 gm. of mepacrine three times a day was given. When this course of treatment was completed, the patient resumed his usual suppressive dose of quinine or mepacrine. Where vomiting prevents the absorption of quinine solution by mouth tablets of quinine bihydrochloride can often be retained. Quinine by injection was reserved for sufferers from pernicious forms of malaria, and for very exceptional cases which did not appear to be responding to quinine by mouth. Both intramuscular and intravenous injections of quinine were used on occasion, without ill effect.

ii. In an editorial the *British Medical Journal* comments on the surprisingly mild nature of the malaria cases described, so startlingly different from that reported in many of the older accounts of malaria in West Africa. The virtual absence of pernicious forms is very noticeable. Perhaps suppressive medication and other preventive measures were responsible for the mild type of infections encountered. The Command and the troops are more "malaria-conscious" than they were in the last war when our forces suffered so much more severely in places in which malaria was no more severely endemic than it is in West Africa. *Norman White.*

Don, C. S. D. & Meyer, P. F. **An Unusual Case of Cerebral Malaria.** *Brit. Med. J.* 1944, Jan. 29, 149, 1 chart.

A soldier in West Africa was admitted to hospital late at night in a drowsy condition five days after falling sick. Examination of the blood revealed a very heavy *P. falciparum* infection: 35 per cent. of the red cells contained parasites. Of the infected cells 17 per cent. contained two ring forms each, and 1 per cent. three or four. He was given 10 grains of quinine dihydrochloride intravenously and 12 grains by mouth at 11·30 p.m., the latter dose being repeated in six hours. Next day he took 10 grains of quinine six-hourly without vomiting. In spite of treatment cerebral symptoms became more pronounced; he was quite unconscious, cold and collapsed 36 hours after the commencement of energetic quinine treatment. Although he had taken fluids fairly well he had passed very little urine. A

glucose-saline drip was put up and by this route 30 grains of quinine and two blood transfusions, each of 500 cc., were given during the course of 24 hours. No urine was passed that day. The following day the urine (voluntarily passed) was typical of that of blackwater fever. No more quinine was prescribed but alkaline treatment and two intramuscular injections (each of 0·1 gm.) of mepacrine methanesulphonate were given followed by mepacrine (0·1 gm. t.d.s.) by mouth. After all this specific treatment hyperpyrexia (106°F.) developed. The patient made a recovery that was complicated by hypostatic pneumonia, which was treated with sulphadiazine 1 gm. four-hourly. *Norman White.*

Hussain, K. K. & Broadbent, M. S. R. **Some Intestinal Symptoms associated with Malaria.** *East African Med. J.* 1943, Oct., v. 20, No. 10, 347–9.

Clinical notes are given of four cases of *P. falciparum* malaria in which the symptoms suggested an acute abdominal or intestinal emergency. One patient was on the point of being operated upon for the relief of intestinal obstruction when the discovery of a heavy malaria infection led to the intramuscular administration of quinine, which resulted in complete recovery. Acute abdominal pain, diarrhoea with blood-stained stools, and acute pain in the groin were respectively the predominant symptoms in the other three cases. The symptoms in all cases responded to anti-malaria treatment. *Norman White.*

Simpson, W. M., Leake, W. H., McMahon, A., Gudex, T. V. & Rueckert, R. R. **Experiences with Malaria at an Advance Base in the South Pacific. A Report of 4,647 Admissions at ——.** *U.S. Nav. Med. Bull.* 1943, Nov., v. 41, No. 6, 1588–95.

The experiences related were acquired in a South Pacific Island Base in which malaria was hyperendemic. During the first year of occupation of the Island there were 4,647 hospital admissions for malaria (3,417 individuals) among U.S. military and naval personnel; 880 of these patients acquired infection in other bases.

A statistical study is presented of 1,184 cases in which plasmodia were found in blood smears in the laboratory of the Naval Base Hospital. Of these 88 per cent. were "ordinary" cases in that they responded to one course of therapy. The remaining 12 per cent. were refractory cases in which two or more courses of treatment were necessary before symptoms and blood parasites disappeared. Of the ordinary cases *P. vivax* was identified in 38·1 per cent., *P. falciparum* in 25·9 and *P. malariae* in 1 per cent. In 35·5 per cent. it was not possible to identify the species; most of these were early cases in which trophozoites were scanty and immature. In general, *P. vivax*, infections resulted in milder attacks than did *P. falciparum* infections; of the former 24·6 per cent. and of the latter 20 per cent. were recurrences or reinfections. A palpable spleen was noted in only 15·9 per cent. of ordinary cases and anaemia (less than 3,500,000 red cells per c.mm.) in 7·4 per cent. of *P. vivax* and in 19·7 per cent. of *P. falciparum* infections. Twelve of the ordinary cases showed definite signs of cerebral involvement. Jaundice occurred in only 1 per cent. of cases. Only 38·8 per cent. of these patients had received suppressive quinine or atebrin therapy for more than a month before the onset of the attack.

Of the 133 cases that were refractory to one or more courses of treatment 32·8 per cent. were *P. vivax*, 45·9 per cent. *P. falciparum*, and 2·4 per cent. *P. malariae* infections. In 18·9 per cent. the species was undetermined. Symptoms were most severe in *P. falciparum* infections, which had a much greater tendency to produce anaemia. Persistent gametocytes were in almost all cases *P. falciparum*. Parenteral atebrin or quinine had to be administered in 7·5 per cent. of the refractory cases. Only one patient developed blackwater fever; he recovered. Only one of the total 4,647 patients died; his malaria was complicated by hepatitis and jaundice following yellow fever vaccination.

Suppressive treatment during the early days of the occupation of the island base was by a daily dose of 10 grains of quinine. Later 3 grains of atebrin twice a week were given. Nearly half the cases of malaria reported were in patients who had received regular suppressive treatment. The treatment of the attack that has given the best results consists of: 30 grains quinine hydrochloride and 4½ grains atebrin daily (in three divided doses) for 3 days; atebrin 4½ grains daily for the next four days. Quinine is given in solution. If there be much vomiting atebrin, 3 grains, is given intramuscularly twice a day for one or two days, after which the treatment is continued by mouth. If gametocytes persist plasmoquine is administered. After two days' rest from all specific therapy quinine hydrochloride, 10 grains, is given daily for five days, on the first two days of which a third of a grain of plasmoquine is given twice a day, and once a day on the remaining three days.

No significant toxic reactions following the use of atebrin were ever observed and liver function tests never revealed any damage to that organ resulting from the long-continued administration of atebrin.

Norman White.

SIMPSON, W. M. & SAGEBIEL, J. L. **Cerebral Malaria. A Report of 12 Cases encountered at U.S. Naval Base Hospital ——.** *U.S. Nav. Med. Bull.* 1943, Nov., v. 41, No. 6, 1596–602.

The 12 cases of cerebral malaria described were treated in a Naval Base Hospital in a South Pacific Island; five of the cases were admitted to that hospital after the acute attack had more or less subsided. The description is prefaced with a note on the pathology of cerebral malaria. A sudden onset of epileptiform convulsions and coma occurred in nine cases; status epilepticus was common. Three patients developed coma without convulsions. The coma varied, from semi-stupor with purposeless movements, to profound shock with complete lack of response to all stimuli. Four patients had signs and symptoms of meningitis. Photophobia and headache were usually present. Acute confusional psychosis developed in six cases, lasting from 2 to 12 days, with lucid intervals. During early convalescence mental fatiguability was a prominent symptom. All patients finally regained complete mental and emotional normality. The febrile reactions were highly irregular.

In eight cases in which the cerebrospinal fluid was examined it was found to be clear, colourless, and under moderately increased pressure. A pleocytosis, varying from 30 to 165 cells, was found in cases with meningitic symptoms and signs. The removal of 25 to 30 cc. of spinal fluid was followed by prompt clinical improvement.

Treatment included the intravenous injection of 7½ grains of quinine dihydrochloride in 250 cc. normal saline, repeated 8-hourly until the

patients could take quinine by mouth, in doses of 30 grains daily for a week. The injections take not less than 30 minutes to administer. The response was dramatic in most cases. The oral administration of nembutal or sodium amytal may be useful. When the patient is violent, sodium amytal should be given intravenously. Spinal puncture should be done at the outset and repeated daily until clinical improvement occurs. Absolute rest in bed is essential. In one case the intravenous injection of quinine was followed by a moderately severe shock reaction; 0·5 cc. of 1 : 1000 epinephrine relieved the patient's alarming symptoms. All the patients made a complete recovery. *Norman White.*

BUTLER, F. A. **Malaria Control Program on a South Pacific Base.** *U.S. Nav. Med. Bull.* 1943, Nov., v. 41, No. 6, 1603–12, 1 fig. & 1 chart.

This describes the success achieved in controlling malaria at a base on a South Pacific island in which malaria was hyperendemic. It is a mountainous island with a flat, poorly drained, peripheral plain through which numerous small streams flow, and which is covered by either jungle or coconut groves The climate is uniformly warm; there is a wet and dry season, and the annual rainfall approximates 90 inches. The indigenous population has been declining for many years. No malaria control work had ever been attempted. Pest mosquitoes abound. The only malaria vector is *A. punctulatus* var. *moluccensis*, which breeds freely in rain pools, road ruts, and other surface waters, and, during the dry season, in semi-shaded marginal pools or streams that are partly covered by vegetation.

In April, 1942, the malaria rate among troops on this base was 2,645 cases per 1,000 per year for new admissions—2,675 for all admissions. In April 1943 the rate had fallen to 130 per 1,000 per year—179 for all admissions. Man-days lost in April 1943 were only one-fifteenth of the loss in April 1942. It is not possible to assess the contribution which any particular control measure has made to the striking success achieved. The measures described include camp site selection, oiling, drainage, screening, carrier control, suppressive treatment, and the establishment of good malaria discipline. The development of extensive drainage and stream-clearance projects is considered the most effectual measure. Good malaria discipline is absolutely essential; this has been found to depend on the willingness of officers to assume responsibility in this matter. Good malaria discipline has kept malaria to low levels in units occupying very malarious areas. Very little use has been made of insecticides and repellents. Mass atebrin therapy of native populations has reduced the numbers of native carriers. Suppressive therapy is an important temporary measure while control is being organized. No toxic effect of continued atebrin administration, 0·4 gm. weekly, has ever been observed, though mild initial intolerance (nausea, vomiting and diarrhoea) was occasionally observed. *Norman White.*

ECKSTEIN, A. **Malaria in Childhood.** *Acta Med. Orientalia* (*Palestine & Near East Med. J.*). 1943, Aug.–Sept., v. 2, No. 4, 123–32.

Infantile malaria differs in many respects from the malaria of adults. The author of this comprehensive paper considers that the peculiar features of malaria in childhood have received insufficient attention and sets out to make good the deficiency. In a previous paper he has

described some of the anomalous manifestations of malaria in young subjects, more especially with regard to disorders of nutrition and metabolism [this *Bulletin* 1943, v. 40, 516]. In the present paper the subject is dealt with more comprehensively.

The author's experience has been gained in Turkey: in that country positive malaria findings are common in the blood of children of the youngest age groups who present few or no symptoms of that disease and such symptoms as there are are often indicative of some quite other pathological condition. The majority of such patients have received no anti-malarial treatment. It is interesting that there is a special Turkish name for occult malaria, *gizli sitma.*

Congenital malaria is not quite so rare as is generally believed. Five definite cases were seen in hospital practice, though that hospital was in a region of only moderate malaria endemicity. In many of the youngest malaria patients there may be little or no fever in spite of abundant parasitaemia.

Malarial attacks in children may occasionally, though very rarely, cause the activation or generalization of tuberculosis with subsequent tuberculous meningitis. There is a very close relationship between malaria and noma. Noma is a common disease in Turkey. The author has seen 155 cases in seven years. In 91 per cent. of these cases malaria infection was diagnosed. Measles had preceded noma in 1 per cent., and typhoid fever in 2 per cent. This was in Ankara where malaria is not endemic (of 123,000 children out-patients malaria was diagnosed in only 3·4 per cent.). The majority of the noma patients were by no means cachectic. Young children were the chief sufferers. The seasonal incidence of noma reaches its height in August as does the seasonal incidence of malaria.

Detailed consideration is given to the difficulties of malaria prophylaxis in children. There is need for very close cooperation between paediatrists and malariologists. Malaria experts might benefit from a special paediatric training; malaria centres might then be child-welfare centres as well.

A summary does less than justice to the large amount of information concerning anomalous forms of malaria in childhood.

Norman White.

Bhowmick, S. K. **Malarial Urticaria—Two Case Reports.** *Indian Med. Gaz.* 1943, Jan., v. 78, No. 1, 48.

"Two cases of malarial urticaria, successfully treated with quinine and alkaline mixture, are reported. Both of them showed hypersensitiveness to malaria parasites in a hyperendemic area. In case 2 the rash did not disappear while the peripheral blood showed malaria parasites and the temperature continued. It is likely that with the sporulation of malaria parasites in the circulation a definite but unknown product is liberated which causes allergy resulting in urticaria."

Thonnard-Neumann, E. Die Splenomegalie im Bilde der chronischen Malaria. [**Splenomegaly in Chronic Malaria.**] *Deut. Tropenmed. Ztschr.* 1943, Jan. 1 & 15, v. 47, Nos. 1 & 2, 1–32; 33–50. [Numerous refs.]

In a long article of 50 pages, accompanied by an extensive bibliography, the author discusses the changes occurring in the spleen, liver, bone marrow, and blood, in chronic malaria.

The paper contains a great store of information in such a form that it will be of great value to all students of malaria, but naturally it does not lend itself to the preparation of an abstract. In the section on treatment the author shows that striking benefit resulted in 17 cases of "malarial cachexia" treated by quinine 0·1 gm. thrice daily, 0·06 gm. ephedrine thrice daily, together with arsenic and iron. Accompanying diseases such as syphilis, helminthiasis, amoebiasis, and malnutrition, also received suitable treatment.

The cases do not seem to have included any of the severest types of malarial cachexia; these could not have been expected to respond so promptly. The average duration of the treatment was 30 days; the average increase in the red blood cells was from 1,800,000 to 3,400,000, and in the haemoglobin from 43 to 70 per cent. The average diminution in the size of the spleen was from 4 or 5 (Schüffner's index) to 2 or 3.

The most striking success was in a case in which the red cells rose from 1,080,000 to 3,070,000, the haemoglobin from 45 to 75 per cent., and the spleen was reduced from 5 to 2, after only 14 days of treatment which included chenopodium for hookworm infection, and neosalvarsan for syphilis.

The extent to which other diseases entered into the picture is shown by the fact that among the 17 patients 10 were treated for hookworm disease, 7 for tertiary syphilis, and 4 for amoebiasis; 11 are shown as suffering from malnutrition. Splenectomy is condemned as being irrational and dangerous; the spleen is considered to play an important part in the establishment of immunity. Ephedrine is preferred to adrenalin, as advocated by Ascoli; the former drug has a more prolonged as well as a safer action in causing a reduction in the size of the spleen.

The author's experience has been chiefly of male adults, in Central and South America, and in Haiti. He rightly emphasizes the importance of economic factors and of measures of control of preventable diseases in general, but he is on debatable ground when he refers to the adverse influence of the "capitalistic mentality" on the physical well-being of indigenous populations. *John W. D. Megaw.*

Placeres, M. El valor funcional del higado en el curso del paludismo crónico. (Contribución al estudio de la exploración clinica funcional del higado, de las hepatitis y hepatosis palúdicas.) [**Function of the Liver in Chronic Malaria.**] *Mem. d. V Congr. Méd. Centro-americano, San Salvador, 5–12 Nov. 1938.* 593–631, 32 figs. [Bibliography.]

Cares, R. **Rapid Diagnosis of Malaria by the Use of a Wratten Light Filter.** *J. Lab. & Clin. Med.* 1943, Nov., v. 28, No. 14, 1750–51.

The E light red filter (series 23A) of the Wratten light filters (Eastman Kodak Co.) has a spectral transmission range parallel to that of eosin, and transmits more light in the red part of the spectrum than eosin does; the red cells consequently appear lighter. The blue-stained protoplasm appears darker owing to absorption of blue and green. For these reasons the use of this filter is recommended to facilitate recognition of malarial parasites in a stained blood film. The simplest and cheapest form of the E filter is the dye-stained gelatin film supplied

in one-inch and two-inch squares ; these can be cut up and mounted between cardboard and fitted either over the substage condenser or in the ocular. *J. F. Corson.*

DAWBER, T. R. **On the Importance of Malaria as a Cause of False Positive Serologic Reactions.** *Ann. Intern. Med.* 1943, Oct., v. 19, No. 4, 651–5. [Summary appears also in *Bulletin of Hygiene.*]

The author of this paper stresses the importance to the individual of a false diagnosis of syphilis, saying that although false positive serological reactions may be so infrequent as not to be of any great moment from the point of view of the public health, each false diagnosis of syphilis may have serious and even disastrous implications for the person concerned ; it follows that every practitioner should be fully aware of the pitfalls. After mentioning as causes of false reactions, yaws, leprosy, infectious mononucleosis, malaria, pneumonia, vaccinia, measles, " and other acute febrile diseases," he regards infectious mononucleosis and malaria as probably being most important in the U.S.A. on account of their frequency and the fact that both are often present in a sub-clinical state.

This, he says, is particularly true of chronic or latent malaria, and he thinks there can be little doubt that when samples are taken from all persons in such a place as a factory or a camp, certain of the donors of the specimens may have latent malaria. Whether such persons, in whose blood parasites cannot at the moment be demonstrated, can give false positive syphilitic serum reactions is still doubted, and the author quotes MOHR *et al.* (*Arch. Intern. Med.*, 1941, v. 68, 898) as having said that a positive reaction may be expected " only during or shortly after the acute febrile illness." The present author's thesis is that latent malaria may have the same effect, and he cites two cases in which failure to demonstrate malarial parasites in the blood led to positive serum reactions being falsely attributed to syphilitic infection.

At the U.S. Marine Hospital in four years, 64 cases of malaria were dealt with, and of this number 19 gave positive reactions for syphilis ; of this number 11 certainly or probably had syphilis. Of the eight in which the author considers the reactions to have been false he details the histories of three. The first patient had had a penile sore five months before admission to hospital, and it had disappeared in two weeks. Five days before admission he had had some fever, and a routine blood test had given a positive reaction for syphilis ; these results were confirmed on repeated retests. Three days after admission to hospital he had a typical bout of malaria, and tertian parasites [presumably *P. vivax*] were found in his blood. Treatment with quinine was started, and the record shows that his blood tested 10, 14 and 21 days later gave negative Wassermann and Kahn reactions, having been strongly positive three days after the fever.

The second patient had a history of rigors and repeated attacks of epistaxis a few days before admission to hospital. Two and five days after admission specimens of blood gave positive reactions for syphilis. As slides were negative for malaria, a diagnosis of latent syphilis was made, but eight days after the second of these tests the patient had a frank attack of malaria, with tertian parasites in the blood, and treatment with quinine was started ; three days later the syphilitic serum reactions were mostly negative or doubtful, and a week later they were all negative.

The author discusses the length of time during which the syphilitic serum reactions may persist and quotes KITCHEN *et al.* [*Bulletin of Hygiene*, 1939, v. 14, 619] as having found in inoculation malaria that it ranged from 8 to 66 days, but in these cases the patients had repeated paroxysms. In his own series all but one became negative within ten days of the institution of anti-malarial treatment. In the exceptional case, details of which are given, the reactions remained positive for 18 days after the last rigor.

The author thinks that it would be safe to reckon on the false positive serum reaction due to malaria disappearing within a month of the start of antimalarial treatment if this is by the "long course" method, lasting six to eight weeks; with the four-day method the reversal of the reactions may not be so rapid. *L. W. Harrison.*

KEOGH, Patricia & SHAW, F. H. **The Pharmacology and Toxicity of Alstonia Alkaloids.** *Australian J. Exper. Biol. & Med. Sci.* 1943, Sept., v. 21, Pt. 3, 183–6, 7 figs.

The bark of *Alstonia*, which is widely distributed in N. Australia, contains a mixture of rather ill-defined and unstable alkaloids. Since they were said to resemble quinine, they were investigated pharmacologically. Although they have been found in animal experiments to have little antimalarial activity, their action on isolated organs bears a striking resemblance to that of quinine. Thus in the rat's intestine, the alkaloids caused a fall in tonus and a temporary cessation of movement, and then rhythmical movements. The non-pregnant uterus of the cat is stimulated to contract. In the isolated frog's heart the amplitude of the beat is diminished but the rate is unaltered. In the intact cat, a fall of blood pressure is produced. In striated muscle, stimulated to contract, the alkaloids produce a fall in the tension developed, followed by a rise. The 50 per cent. lethal dose for mice when given by intraperitoneal injection is 800 mgm. per kgm., for rats 500 mgm., and for guineapigs 500 mgm. per kgm. Figures for various other animals are also given; there is a fairly close parallelism with the lethal doses for quinine. [For further details the original should be consulted.] *F. Hawking.*

ALBERTO ALVARADO, C. Dirección general de paludismo. Memoria del año 1942. [**Malaria Service; Report for 1942.**] *Bol. Sanitario.* Buenos Aires. 1943, Jan.–Mar., v. 7, Nos. 1, 2 & 3, 3–29, 1 chart.

DAVEY, D. G. **Biology of the Malarial Parasite in the Vertebrate Host.** [Correspondence.] *Nature.* 1944, Jan. 22, 110–11.

The author discusses the early development of malarial parasites in birds, and from observations on *P. gallinaceum* concludes that after injection of sporozoites into the peripheral blood these disappear from the blood stream within a few minutes and enter the tissues, where they pass through a developmental phase. Following this primary phase there is a release of parasites into the blood stream, and, in the case of *P. gallinaceum*, into other tissue cells, where the secondary tissue phase, represented by the well-known exoerythrocytic schizonts, is formed. These secondary phase forms, unlike those of the primary phase, are capable of indefinite schizogony, and may persist as long as infection lasts. The secondary tissue phase may develop from the erythrocytic forms, or from the primary tissue phase. These two phases

react differently to certain drugs. The author thinks that the primary tissue phase may be common to all malarial parasites, whereas the secondary phase has been described definitely only in the case of *P. gallinaceum* and *P. elongatum*, and probably in *P. circumflexum* and *P. cathemerium*. It is surmised that the secondary tissue phase may be a specialized feature of a few malarial parasites only. It is an urgent problem to discover if this phase is a feature of the human parasites. It is stated that the name cryptozoites has been introduced for the parasites of the primary tissue phase, but the term was limited by its introducers to all the stages of development from the sporozoite up to the first mature schizont, and not to the second or any later generation of parasite. The writer of the letter does not state whether his primary tissue phase represents only one or more than one generation of parasites [this *Bulletin*, 1943, v. 40, 815].

According to the views expressed by the author, from the chemotherapeutic point of view there are five different forms of parasite which have to be considered, *viz.*: sporozoites, primary phase forms, secondary phase forms, erythrocytic forms, gametocytes. A true causal prophylactic, it is stated, will be one which acts upon the sporozoite or the forms of the primary phase. *C. M. Wenyon.*

ADLER, S. & TCHERNOMORETZ, I. **The Extra-Erythrocytic Origin of Gametocytes of *Plasmodium gallinaceum* Brumpt, 1935.** *Ann. Trop. Med. & Parasit.* 1943, Dec. 31, v. 37, Nos. 3 & 4, 148–51, 1 fig.

The authors have shown in a previous paper [this *Bulletin*, 1942, v. 39, 524] that the administration of quinine by injection in daily doses of 150 mgm. per kgm. of body weight will prevent the development of pigmented erythrocytic forms, though exoerythrocytic schizonts continue to develop in the internal organs. From time to time, however, small unpigmented parasites appear in the erythrocytes, evidently as a result of invasion by merozoites of the exoerythrocytic cycle. Continued administration of quinine will bring about the eradication of these young erythrocytic forms, which are thus given no opportunity to develop further. If, however, with the appearance of these young erythrocytic forms, which may occur in as many as 10 per cent. of the erythrocytes, quinine administration is stopped, the young forms will develop, not only into pigmented schizonts but also into gametocytes. The first recognizable gametocytes may be found in 27½ hours, and mature forms in about 40 hours. It is thus clear that gametocytes may develop directly from the merozoites which result from exoerythrocytic schizogony. *C. M. Wenyon.*

SCHENG, T. D. Zur Wirkung von Arzneistoffen auf die exoerythrocytären Entwicklungsformen der Plasmodien. [**The Action of Drugs on the Exoerythrocytic Forms of Malaria Parasites.**] *Arch. f. Exper. Path. u. Pharm.* 1943, June 12, v. 201, No. 5, 502–19. [47 refs.]

The action of quinine, plasmoquine and atebrin on erythrocytic and exo-erythrocytic forms of *P. cathemerium* has been investigated *in vitro*. The latter are very numerous in the livers of canaries infected by sporozoites but are scanty in the peripheral blood. The effect of drug

action was judged by stained preparations and by the nature of the infection which resulted in fresh canaries inoculated intramuscularly with the various preparations.

The technique employed was as follows: A canary previously infected with sporozoites, or by liver emulsion rich in exo-erythrocytic forms, was killed at the height of blood infection by severing the neck vessels. The total blood was collected in citrate, and further diluted with saline. Three series, one for each drug, was prepared in small glass vessels as follows:—

(1) *a.* 1 cc. saline+ 0·3 cc. infected blood. Control.
b. 1 cc. drug+0·3 cc. infected blood.
(2) 1 cc. drug+0·3 cc. infected blood+a small amount of normal canary liver emulsion.
(3) *a.* 1 cc. saline+canary liver emulsion rich in exo-erythrocytic forms. Control.
b. 1 cc. drug+canary liver emulsion rich in exo-erythrocytic forms.

The drugs were used in the following concentrations, which are very much higher than is attained *in vivo*, namely, quinine 1/300–1/800, plasmoquine 1/2000–1/3000, atebrin 1/200–1/300. They were allowed to act for a period of five hours at a temperature of 4°C. After treatment the blood which contained erythrocytic forms proved mostly non-infective to fresh canaries, while on the other hand the liver preparations rich in exo-erythrocytic forms nearly all gave rise to acute infections. From these experiments it appeared that the latter forms are resistant to the drugs employed. The addition of fresh liver emulsion to infected blood inhibited or depressed the action of the drug in only a few cases. The action of atebrin was least impaired by fresh liver, while that of plasmoquine was most affected by its presence, as a result, it is thought, of being bound by the tissue. The fact that exo-erythrocytic forms of *P. cathemerium* are not sensitive to the drugs tested is ascribed to their particular habitat and metabolic characters.

J. D. Fulton.

BLACKWATER FEVER.

Cole, A. C. E. **A Case of Anuria in Blackwater Fever.** *East African Med. J.* 1943, Nov., v. 20, No. 11, 381–2.

This is a report of a remarkable case of blackwater fever with unusually mild symptoms but with almost complete suppression of urine for eight days.

So far as was known the patient, a young Indian male, had had only one other attack of malaria and that occurred a year previously. In the present attack he had had fever for four days before admission to hospital and had taken five grains of quinine daily for it; on the day of admission he noticed that his urine was dark.

During the first four days in hospital he had slight jaundice and occasional vomiting; his urine was dark red, contained much albumin and gave a dark brown amorphous deposit with some casts. No

malarial parasites were found in his blood. Fluids were given in the form of lemonade, tea and alkalis by mouth and glucose saline i.v. (1,600 cc.) on the 3rd day and i.m. (800 cc.) on the 4th day. On the 4th day he seemed quite well, with normal temperature, blood pressure 120/60, but he had occasional small vomits, his blood urea was 260 mgm. per 100 cc. and his face was slightly puffy. On the 8th day *beer* was prescribed, one bottle daily, and next day he passed 18 oz. of clear urine containing only a trace of albumin. On the 16th day his temperature rose to 100°F. and his blood showed numerous subtertian malarial parasites; atebrin was given and his temperature fell in two days and convalescence was uneventful. Four weeks after the onset of the illness tests of his urine showed no albumin and gave renal function (van Slyke) figures of 93 and 114 per cent. of normal. The important features of the course of the illness are shown in a table reproduced here:—

Day	Urine	Fluid intake	Blood urea	Temperature	Haemoglobin
	drachms	oz.	mgm.		per cent.
1 ...	7	?	—	99·4	—
2 ...	6	12	104	102·4	78
3 ...	11	109	—	100·0	—
4 ...	3	55	256	99·0	—
5 ...	6	37	—	98·0	—
6 ...	4	59	—	normal	—
7 ...	6	58	—	,,	—
8 ...	7	41	—	,,	60
	oz.				
9 ...	4½	47	386	,,	—
10 ...	18	46	—	,,	—
11 ...	53	43	214	,,	—
12 ...	116	43	—	,,	—
13 ...	108	54	—	,,	—
14 ...	110	50	117	,,	60
28 ...	—	—	32	,,	68

The author remarks that the illness resembled the effects of obstruction of the ureters rather than acute nephritis; fever was low and haemolysis slight. *J. F. Corson.*

TRYPANOSOMIASIS.

LAVIER, G. L'évolution de la morphologie dans le genre *Trypanosoma*. [**Evolution of Morphology in the Genus** *Trypanosoma*.] *Ann. Parasit. Humaine et Comparée.* 1942–1943, v. 19, Nos. 4–5–6, 168–200, 8 figs. & 1 plate. [33 refs.]

The author first gives a critical review of the various methods of classification proposed for trypanosomes and considers their life-histories and especially their cycle in the vector. He concludes that the classification should be based entirely on morphological characters, and that the blood form of the trypanosome, as it occurs in the vertebrate host, should be the basis for the differential diagnosis of species. However, since the appearance of different trypanosomes varies in the course of the infection it is necessary to define more precisely the stage

of the trypanosome to be used for this purpose. With this object in view the author considers the characteristics of the trypanosomes parasitic in various groups of vertebrate hosts.

The most ancient forms are long and slender trypanosomes with a well-developed undulating membrane, a kinetoplast situated at some distance from the posterior end of the body and from the nucleus. Such forms are found mainly in fishes. In some of the amphibians and reptiles a new type of trypanosome makes its appearance: its body is broader, while the kinetoplast and nucleus tend to approach each other. A further modification takes place in some trypanosomes of the Anura and lizards: the broadening of the body attains its maximum expression in the large rounded forms of the *rotatorium*-type. The trypanosomes of birds are somewhat similar to the thick-set forms seen in reptiles, but the kinetoplast tends to be further separated from the nucleus than in the latter. Finally, in mammals there appears a special form, represented by trypanosomes of the *lewisi* group.

The author believes that the phylogenic development of the trypanosomes is correlated with the evolution of their vertebrate hosts. Originally of a uniform type (*e.g.* in fishes), the trypanosomes gradually become more diversified (*e.g.* in amphibia and reptiles), but later their development undergoes regression and they again assume a more uniform appearance (*e.g.* in birds and mammals). In the foregoing groups of trypanosomes multiplication takes place only in certain stages of their life-cycle, giving rise to a form which is incapable of dividing and which, according to the author, constitutes the "adult" form. The curtailment of the development noted in avian and mammalian trypanosomes takes place at the expense of the "adult" form, by a process similar to neoteny.

The last group to be considered is that of the pathogenic mammalian trypanosomes. Their main characteristics, apart from pathogenic action, are: (1) continuous multiplication [as first emphasized by the reviewer (1936): *Parasitology*, v. 28, 98]; (2) loss of rigid host-specificity; and (3) development in the "anterior station" of the vector. Since the first two features have also been observed in certain strains of non-pathogenic trypanosomes which had become virulent (*e.g. T. lewisi*), they are regarded as characteristic of pathogenic trypanosomes, while the uninterrupted multiplication of the latter is interpreted in the sense that they had undergone the regression noted above, with the result that the true "adult" forms have disappeared, leaving only the "young" forms which are capable of dividing indefinitely.

Morphologically, the pathogenic trypanosomes are characterized by three main types: (1) monomorphic long trypanosomes with a free flagellum (*T. vivax* and *T. uniforme*); (2) monomorphic short trypanosomes without a free flagellum (*T. congolense* and *T. simiae*); (3) polymorphic or dimorphic trypanosomes comprising both of the above types (*T. brucei*, *T. gambiense*, *T. rhodesiense*, as well as *T. evansi* and *T. equiperdum*). The different species are then dealt with separately. It is thought that all the pathogenic forms have originated from trypanosomes of ungulates which originally developed in the "posterior station" of their vectors, but later began to be transmitted by tsetse flies and adapted themselves to development in a salivary medium ("anterior station"). [Somewhat similar views were expressed by the reviewer to explain the origin of the development in the "anterior station": Hoare (1925). *Arch. Russes Protistol.* v. 3, 177; Hoare & Coutelen (1933). *Ann. Parasitol.* v. 11, 196].

In discussing the affinities of *T. evansi*, Lavier upholds his earlier view (1927) [also suggested by the reviewer in 1925 (*loc. cit.*)] that this species is the ancestral form from which *T. brucei* had originated, as against the reviewer's recent conclusion [HOARE (1940). *Parasitology*, v. 32, 105] that *T. evansi* is an aberrant race of *T. brucei*.

Lavier further emphasizes the fact that the degree of adaptation to the development in the "anterior station" of tsetse manifested by the pathogenic trypanosomes is considerably lower than the adaptation of the non-pathogenic mammalian trypanosomes to development in the "posterior station" of their intermediate hosts. While in the latter group almost 100 per cent. of the vectors become infected, the infectivity for tsetse flies is 50 per cent. in *T. vivax*, less in *T. congolense*, and quite insignificant in the *brucei* group [below 1 per cent. according to the latest data: *cf.* BURTT, this *Bulletin*, 1943, v. 40, 369]. The relative transmissibility by their vectors also reflects the evolutionary history of the different trypanosomes: the more perfect the adaptation between parasite and vector, the older the association between the two.

The paper is well illustrated by a number of figures, including a diagram showing the morphological affinities of trypanosomes from different classes of vertebrate hosts. *C. A. Hoare.*

LOURIE, E. M. & COLLIER, H. O. J. **Unimpaired Susceptibility of *Trypanosoma rhodesiense* to Arsenicals after Intensive Treatment by Mepacrine.** *Ann. Trop. Med. & Parasit.* 1943, Dec. 31, v. 37, Nos. 3 & 4, 205–10.

Repeated exposure of trypanosomes to subeffective doses of acridine compounds such as acriflavine leads to the development of trypanosomes which are resistant to acriflavine and to arsenical compounds. Mepacrine (atebrin) consists of an acridine nucleus and a long side-chain. Men, taking mepacrine in Africa to prevent malaria, may sometimes become infected with trypanosomes; and the question was asked, whether the mepacrine would cause the trypanosomes to become resistant to arsenicals (tryparsamide). The possibility was tested by exposing trypanosomes (*T. rhodesiense*) to the maximum tolerated amounts of atebrin, alternately in mice and *in vitro*, over a period of 20 weeks. No resistance to arsenicals or to mepacrine developed as the result of this treatment. It is concluded that the suppressive administration of mepacrine can safely be given to men exposed to trypanosomal infection without any risk of the development of arsenical or acridine-resistance in the trypanosomes. *F. Hawking.*

POTTER, W. B. **Acute Visual Impairment during Tryparsamide Therapy.** *Southern Med. J.* 1943, Oct., v. 36, No. 10, 697–701. [18 refs.] [Summary appears also in *Bulletin of Hygiene*.]

Visual defects with objective changes attributable to tryparsamide therapy have been reported by SLOAN and WOODS (1936) in 3·53 per cent. of cases, and by WOODS and MOORE [this *Bulletin*, 1924, v. 21, 981] in 5·5 per cent. The defects have been classified as acute and chronic, and of the latter, there are cases with subjective symptoms only (shimmering and blurring of vision—without changes in the field of vision) and those with objective symptoms, which consist chiefly in

contraction of the field of vision, but only rarely in interference with central vision.

The author of the present paper, after mentioning the above findings by other workers, says that comparatively little attention has been paid to acute manifestations of tryparsamide poisoning, of which he relates four cases; they represent less than 1 per cent. of 500 patients he has treated with this remedy. The first, a tabetic negro woman had foggy vision 24 hours after a first injection of tryparsamide (3 gm.), and on the 5th day, with normal central vision and no visible changes in the fundi, the field was contracted to within 5 degrees of the fixation point. A month later, when the patient was last seen, the field had expanded to 15 to 20 degrees; a year later, reports suggested that there had been no further improvement. The second, a white tabetic man, developed much the same symptoms within 24 hours of the second of two injections of 3 gm. tryparsamide at a week's interval. The patient was observed for a period of a year and a half, and the fields had expanded over a period of 6 months to within five degrees of their previously normal limits. The third, a tabetic white woman, had severe loss of vision, with loss of light perception found five days after an injection of 3 gm. tryparsamide. Three weeks later central vision had returned, but there was marked contraction of the field in all meridians. At the end of five weeks, the day after institution of fever therapy, the author's report is that: "Clinical findings available indicated vision of Jaeger IV; there was no distance visual record available. The confrontation field was approximately normal. Fundus findings continued to be negative." In the fourth case, a white female tabo-paretic with normal vision, blindness was so severe 48 hours after the injection of 3 gm. tryparsamide that the patient required continual assistance in eating and getting about. Seven weeks later, central vision had returned, but was defective (20/200 in each eye), and there was marked contraction of the fields.

In discussing this type of accident, the author favours the view that it is due to idiosyncrasy and he quotes a case of LEINFELDER'S (*J. Amer. Med. Ass.*, 1938, v. 111, 1276) in which death from other causes nine days after similar loss of vision gave the opportunity for histological examination, with these results: "In the necropsy specimen of the optic nerve a moderate degree of retinal sclerosis was noted. In the central retina areas of degenerative changes were noted in the inner nuclear layer, and cellular and nuclear structure could not be visualized. In the peripheral retina, where the greatest degenerative change was noted to occur, ganglion cells showed a cloudy cytoplasmic appearance, and Nissl substance had largely disappeared." These changes were compared by Leinfelder to the cellular reaction in acute intoxication of the central nervous system.

Potter is inclined to think that injections of thiamin have little therapeutic value in such cases, and the same applies to spinal drainage. On the question of the value of preliminary examination of the fundi as a safeguard against such accidents, he says that, although in these cases no contraindication was found, it has been established that thorough preliminary examination can guard against progressive deterioration of vision consequent on the "chronic" type of tryparsamide reaction, and the Supreme Court of Virginia ruled that failure to examine the eyes before the use of tryparsamide or upon the appearance of visual effects constituted negligence.

L. W. Harrison.

SANDGROUND, J. H. & HAMILTON, C. R. **Studies on the Detoxication of Organic Arsenical Compounds. I. Detoxication by means of *p*-Aminobenzoic Acid of certain Pentavalent Arsenical Drugs given in Massive Doses to Rats. II. Correlation of the Quantity of *p*-Aminobenzoic Acid required to protect Rats against High Doses of Carbarsone and Arsanillic Acid.** *J. Pharm. & Exper. Therap.* 1943, v. 78, 109–14; 203–8.

——. **Studies on the Detoxication of Organic Arsenical Compounds III. The Time-Factor influencing *p*-Aminobenzoate Protection of Rats receiving Lethal Doses of Phenyl Arsonates.** *Ibid.* 209–14. [Summaries taken from *Vet. Bull.* 1944, Jan., v. 14, No. 1, 39. Signed R. ALLCROFT.]

I. As it has been demonstrated that *p*-aminobenzoic acid (PAB) inhibits the action of sulphonamides that are active against the malarial parasites, the question whether a similar mechanism explains the susceptibility of pathogenic trypanosomes to certain pentavalent arsenicals was investigated because of the structural relationship between the arsenic compounds and sulphanilamide. Three groups of rats infected with *Trypanosoma equiperdum* were given daily one of the following treatments—(1) intravenous injection of 1,000 mg. per kg. of PAB, (2) intravenous injection of 1,000 mg. per kg. of PAB plus a single small subcurative dose of carbarsone (*p*-carbaminophenyl arsonic acid), and (3) daily doses of PAB plus a high dose (500 mg. per kg.) of carbarsone. The results showed that PAB *per se* was not trypanocidal nor did high doses of PAB interfere with the trypanocidal action of carbarsone. It was, however, observed that, in contrast to previous experience, none of the rats receiving the high dose of carbarsone+PAB died before the 15th day, while most of them survived the full 30-day observation period. Further experiments were carried out with rats to investigate the detoxicating action of PAB with carbarsone and other pentavalent arsenical compounds, *viz.*, tryparsamide, acetarsone, arsanilic acid, and phenyl arsonic acid. As much as 1–3 g. of PAB per kg. body weight daily were given for 3–5 days with massive doses (about LD_{100}) of the arsenicals. In each case PAB was found to be very effective in reducing the fatalities among rats to which high acutely poisonous doses of the arsenicals were given. The protective action of the PAB could be detected in the majority of rats within 24 hours of administration. Detoxication was independent of the route by which either the arsenic compound or the PAB was given. Also no inhibition by PAB of the trypanocidal action of the various arsenicals was observed.

II. In an investigation of the quantitative relationship between the protective action of PAB and the toxicity of pentavalent arsenicals, a freshly prepared 10% or 20% aqueous solution of PAB was given to rats either orally or intraperitoneally while a solution of the sodium salt of the arsonate was injected some minutes later, usually into the abdominal cavity. Carbarsone and arsanilic acid were used as two typical phenyl arsonates. Taking 1,200–1,500 mg. per kg. as the minimum universal lethal dose of carbarsone (LD_{100}), it was found that all rats were protected against this dose by the prior administration of 750 mg. per kg. of PAB followed by the same quantity on two subsequent days. Whether a smaller quantity of PAB would have been equally beneficial was not determined. To determine the lower extreme of the protective range of PAB, single diminishing doses were administered to several groups of rats which received injections of carbarsone

or arsanilic acid at a rate approximating the LD_{90} respectively of these two compounds (1,000 mg. per kg. of carbarsone or 400 mg. per kg. of arsanilic acid). 500 mg. per kg. PAB was sufficient to confer protection on nearly all rats that received the LD_{90} of carbarsone, while virtually total protection was afforded by 250 mg. per kg. PAB against the LD_{90} of arsanilic acid. Below these levels partial protection for the group as well as for individual rats was observed. It was found that a single injection of PAB was capable of conferring the protection.

III. Further experiments showed that the length of time of the administration of PAB before or after administration of the pentavalent arsenical compound significantly influenced the survival rate of the group. "Neutralization" of the lethal effects of the arsenical was fully achieved when both PAB and arsenical were administered simultaneously (mixed) or when PAB was administered within one hour (in the case of carbarsone), or up to three hours (in the case of arsanilic acid) before the arsenical. When, however, the arsenical was injected before the PAB, as short an interval as 15 min. for carbarsone and 30 min. for arsanilic acid was associated with a significant reduction in the detoxicating action of PAB ; a greater lapse of time was associated with an almost directly proportional loss of protection. In a discussion speculating on the mechanism underlying this detoxicating action of PAB, it is stated that PAB does not confer much protection against lethal doses of the trivalent arsenicals, with the possible exception of neoarsphenamine.

CARMICHAEL, J. & BELL, F. R. **A Preliminary Study of 4 : 4′-Diamidino Dimethyl Stilbene in the Treatment of** *Trypanosoma congolense* **in Cattle.** *Ann. Trop. Med. & Parasit.* 1943, Dec. 31, v. 37, Nos. 3 & 4, 145–6.

This compound was shown by FULTON and YORKE [this *Bulletin*, 1943, v. 40, 19] to be curative for *T. congolense* infections in mice. In the present work, the compound was given to cattle as a single dose of 5 per cent. solution freshly prepared. When injected intravenously, doses of 2·5 and 5 mgm. per kgm. cleared the blood for 10–12 days but all six cattle relapsed. When 10 mgm. per kgm. were given to six cows, four were cured, one relapsed and one was poisoned. When 12·5 mgm. per kgm. were given to four cows, two were cured and two were poisoned. Two cows were given 10 mgm. per kgm. intramuscularly and both relapsed. Two were given 12·5 mgm. per kgm. and both were cured.

All the deaths but one occurred within a few minutes of the injection, with extreme dyspnoea and profuse salivation. In one case, death was delayed for 1½ hours. No delayed poisoning occurred.

F. Hawking.

FULTON, J. D. & YORKE, Warrington. **Studies in Chemotherapy. XXXVI. The Therapeutic Action of various Compounds in Mice infected with** *Trypanosoma congolense.* *Ann. Trop. Med. & Parasit.* 1943, Dec. 31, v. 37, Nos. 3 & 4, 152–7. [31 refs.]

A useful detailed review is given of the action of drugs upon infections due to *T. congolense*, for which the original paper must be consulted.

Experiments were made on mice infected with this parasite, a single dose of the compound being injected intraperitoneally. Many compounds were tested, but some representative results are as follows, the doses being given as mgm. per 20 gm. mouse :—

	Minimum effective dose	Minimum curative dose	Maximum tolerated dose
7 amino-9 (*p*-aminophenyl)-10 methyl phenanthridinium chloride	0·025	0·5	0·5
Diamidino stilbene	0·5	1	1
Diamidino-dimethyl-stilbene	0·1	0·5	1
Tartar emetic	0·5	>1	1
Surfen C	4	>4	4
Fouadin	10	20	20
Neostam	10	10	10

[*Minimum effective dose* (M.E.D.).—The minimum dose which sufficed to clear the blood of at least 80 per cent. of the treated mice, irrespective of time. Relapse followed. *Minimum curative dose* (M.C.D.).—The minimum dose which sufficed to cure (thirty days' observation) at least 80 per cent. of the treated mice. See this *Bulletin*, 1931, v. 28, 909.]

The two most active compounds were the phenanthridinium compound and diamidino-dimethyl-stilbene. Many other compounds were found to be inactive, including suramin (Bayer 205).

F. Hawking.

Chagas Filho, Carlos. Moléstia de Chagas no Brasil. [**Chagas's Disease in Brazil.**] *Bol. Oficina Sanitaria Panamericana.* 1943, Sept., v. 22, No. 9, 773–9. English summary.

An excellent, though condensed, account of Chagas's disease presented at the Pan-American Conference held at Rio de Janeiro in September 1942. The address was delivered by the son of the Chagas who first described the disease in 1909 in Minas Geraes and who thought it was a local condition. It has since been shown to exist widely in America, north and south. The author deals with the aetiology, pathogeny, epidemiology, insect vectors, naturally infected reservoir hosts, and measures of prophylaxis. He gives the following list of insects found naturally infected in Brazil: *Triatoma brasiliensis, T. infestans, Eutriatoma sordida, Panstrongylus megistus* [*Rhodnius prolixus* he does not give in his list], *T. brasiliensis melanica, T. chagasi, T. rubrofasciata, T. vitticeps, R. pictipes, R. brumpti, E. maculata, E. rubrovaria, P. geniculatus* and *Cavernicola pilosa.* The most important are the first five because they infest the houses. As reservoir hosts he mentions: *Felis domesticus, Cañis familiaris; Dasypus novemcinctus, Euphractus sexcinctus, Dasypus hybridus* (armadillos); *Chrysothrix sciurus* (squirrel monkey); *Tayra barbara* (a weasel-like animal); *Marmosa cinerea, Didelphys* sp. (opossums); *Tamandua tetradactylus* (ant-eater); and *Sus domesticus,* besides several species of bats.

Surveys are in progress in Rio Grande do Sul, Minas Geraes and in North Brazil to gather more complete data regarding insect vectors, reservoir hosts and the incidence of the disease in man.

H. Harold Scott.

MAZZA, S. & ORIBE, H. R. Investigaciones sobre enfermedad de Chagas. I. La enfermedad de Chagas en el territorio nacional Formosa. [**Chagas's Disease. I. In the Formosa Territory, Argentina.**] *Universidad Buenos Aires: Misión de Estudios de Patologia Regional Argentina (Jujuy). Publicación No. 66.* 1943, 3–47, 29 figs. & 4 pls.

In Formosa, including Las Lomitas, the authors have examined 2,116 Triatomidae and found 1,026 (48·5 per cent.) positive. Of the total, 434 were positive among 899 (48 per cent.) in 86 dwellings in 33 localities in Formosa itself; 265 positive among 477 (55 per cent.) in 47 dwellings in 16 localities in the military zone, and 327 among 740 in 87 dwellings in Las Lomitas (44 per cent.). In the same areas 3, 2 and 4 acute cases respectively were seen in man, and in the first district three armadillos, in the second three kittens and a puppy, and in the third five puppies, were found naturally infected. In an adjacent district of Paraguay, 17 adult insects, 9 nymphs and 4 larvae were examined from three forts, and 6, 6 and 3 respectively were positive, altogether 15 [or, as the authors call it, 50 per cent.]. *Triatoma infestans* collected in the boles of trees near the dwellings have been found positive in 50–80 per cent. One ranch is quoted as an example; here an acute case of Chagas's disease was observed, and seven adult insects captured in the dwelling were all positive and one of two larvae; also two kittens and a puppy had *T. cruzi* in their blood in large numbers, though they seemed to be in perfect health, totally unaffected by the infection. Finding infected insects in the stables and places not inhabited by human beings, the authors were led to test whether horses, as well as dogs and cats, might serve as hosts, and they easily infected a colt by inoculation, conjunctivally, by mouth, and subcutaneously, with the faeces of infected Triatomidae. They do not report natural infection in these animals. Human infection in Formosa was proved by Professor Mazza in May 1936 [this *Bulletin*, 1937, v. 34, 135], and by January 1938, eleven cases had been reported. The authors give clinical details of nine of these.

Besides investigating the presence of *T. cruzi* in man and in wild and domestic animals, the authors carried out the Guerreiro-Machado test on 45 adults with cardiac signs, who had lived for some years in Las Lomitas, and found 15 of them to react positively. The physical signs of these are detailed, with reproductions of the teleradiographic recordings of the chest and the heart measurements, and the differential leucocyte counts. These need not be detailed here; they showed no departure from what is usual in such cases. *H. Harold Scott.*

MAZZA, S. & JAUREGUI, R. B. Investigaciones sobre enfermedad de Chagas. II. Otras observaciones de primer período de enfermedad de Chagas en Las Lomitas. [**Chagas's Disease. II. In Las Lomitas.**] *Universidad Buenos Aires: Misión de Estudios de Patologia Regional Argentina (Jujuy). Publicación No. 66.* 1943, 48–52, 4 figs.

It would appear that the medical service in Formosa Territory is being reduced and the garrison is no longer stationed there. Prior to 1937, although the medical men had been told of the presence of Chagas's disease in the district, they had not reported any cases. The

houses were of a structure and in a condition to favour the multiplication of the Triatomid insects and further investigation was undertaken. As would be expected, cases were found and three are recorded here, two in children of 2 years and one in a girl of 14 years. All three were typical. *H. Harold Scott.*

MAZZA, S. Comprobaciones de *Triatoma platensis. Eutriatoma oswaldoi, Panstrongylus seai y Psammolestes coreodes* en la provincia de Santiago del Estero, todas ellas sin infestación y de *Eutriatoma sordida* con infestación por *S. cruzi.* Otros datos sobre infestación esquizotripanósica natural silvestre de *Triatoma infestans.* [**Examination of (Argentine) Triatomidae for Infection by** *Trypanosoma cruzi.*] Reprinted from *Prensa Méd. Argentina.* 1943, Aug. 25, v. 30, No. 34, 23 pp.

The importance of this article rests in its negative records as much as in the positive. Professor Mazza has examined numerous Triatomidae for the presence of developing forms of *T. cruzi. Triatoma platensis,* nymphs, larvae and adults, have been examined in considerable numbers, some of them taken from the nests of birds, but none of them has been found positive. *Eutriatoma sordida* was sometimes found infected (but not in all parts, *e.g.,* the Department of Alberdi yielded negative findings) and at times in association with *Triatoma infestans. Eutriatoma oswaldoi* which has been found infected in Jujuy Province has not been found positive in specimens collected elsewhere, *e.g.,* parts of Córdoba, the Provinces of Catamarca and La Rioja. A specimen of *Panstrongylus seai* sent from S. Javier Department of Córdoba Province in 1939 was found heavily infected, but examinations of others have proved negative. *Psammolestes coreodes* from Alberdi department, from the Provinces of Santiago del Estero, Jujuy (Santa Bárbara) and Campo del Cielo, have been examined but none found positive. The results of the examinations of these and of *Triatoma infestans* are presented in a series of tables. *H. Harold Scott.*

TOM, N. **A Modification of the N.N. Medium for cultivating** *Trypanosoma cruzi. Amer. J. Trop. Med.* 1943, Nov., v. 23, No. 6, 615–16.

The following modification of the Novy and MacNeal medium for cultivating trypanosomes has the advantages that it uses less agar and is autoclaved. In comparative tests with PACKCHANIAN'S modification it was found to give equal and similar results. The trypanosomes remained viable for at least six months and were cultivated for ten successive generations.

Method of preparation.—Infuse 500 gm. of fat-free ground meat in 1,000 cc. of water overnight at 4–6°C.; heat gradually until the proteins are coagulated, cool, strain through gauze, and add Bacto-peptone 10 gm. and NaCl 5 gm. Adjust to *p*H 7·4, boil for 20 minutes, cool, filter through paper, and make up the volume to 1,000 cc. Dispense and autoclave for 1 hour at 15 lb. pressure and store at 4–6°C. As required for use add 0·2 per cent. agar and one-third of the volume of sterile defibrinated rabbit blood; inspissate and autoclave at 15 lb. for 20 minutes; keep in the ice-box (4–6°C.) overnight and incubate at 37°C. to test for sterility.

After inoculation with *T. cruzi* the tubes are rubber-capped and incubated at 25°C. *J. F. Corson.*

FULTON, J. D. **A Comparison of the Biological Action of Bayer 7602 (AC) and the Corresponding I.C.I. Synthetic Product.** *Ann. Trop. Med. & Parasit.* 1943, Dec. 31, v. 37, Nos. 3 & 4, 164–73.

Bayer 7602 (Ac) was described by IENSCH (1937); it consists of two 2-methyl-4-amino-quinoline groups joined by a diallyl malonyl group in position 6. It has been used in the treatment of Chagas's disease, due to *T. cruzi*; clinical improvement results but it is doubtful whether all the trypanosomes of the patient are killed. [For a review of the literature, the original should be consulted.]

The present experiments were performed with *T. cruzi* infections of young mice, which were treated in an early stage of the infection. The blood was subsequently examined at frequent intervals for three months. Some ampoules of Bayer 7602 (AC) were available and the action of these was compared with that of samples manufactured by I.C.I. Ltd. The maximum tolerated dose of the I.C.I. drug was 96 mgm. per 20 gm. mouse orally, or subcutaneously (ulceration occurred); for both preparations it was 3 mgm. intraperitoneally, and 0·1 mgm. intravenously. When it was given to infected mice as 1–4 doses approaching the maximum tolerated amount, the trypanosomes disappeared for a time but ultimately almost all the mice relapsed. When given by mouth the drug was ineffective. The drug has little value as a prophylactic to prevent infection. There was no significant difference between the German and the British products. The drug has no action on *T. rhodesiense* or *T. congolense*. *F. Hawking.*

LEISHMANIASIS.

SÜSSKIND, S. & ROTH, J. **A Note on the Treatment of Two Cases of Infantile Leishmaniasis with Stilbamidine.** *Ann. Trop. Med. & Parasit.* 1943, Dec. 31, v. 37, Nos. 3 & 4, 158–64, 3 figs. on 1 pl.

The two cases were in Palestine, the first in a child 5½ years of age and the second in a child 10 years of age. The first received two courses of stilbamidine and one of urea stibamine. In the first course 38 intravenous injections, representing 1·17 gm. of stilbamidine, were administered, usually at intervals of two days, in a little under three months. As the child developed whooping cough he was sent home, where during the following month and a half 18 injections of urea stibamine, each representing 0·03 gm. of the drug, were given. The condition of the child deteriorated and he was readmitted to hospital, where during the succeeding four months 87 injections of stilbamidine, representing a total of 3·75 gm. were given. The individual doses varied from 30 to 50 mgm. and were given daily except for an interval of 14 days in the middle of the course. On two occasions during the first course attacks of bronchopneumonia occurred. After the second course no further treatment was given, the child being in good health two years later.

The second case was not diagnosed as kala azar till three years after the initial symptoms. In this case the stilbamidine was administered in 10 per cent. solution of glucose—50 mgm. in 10–12 cc. The injections were given daily, two hours after breakfast. The following doses

were given : 2 of 20 mgm., 7 of 30 mgm., 2 of 35 mgm., 61 of 40 mgm., 3 of 45 mgm., 52 of 50 mgm. The treatment was continuous during about five months, except for two breaks of about six days each. The child was in good health a year later.

In the two cases the stilbamidine injections caused no serious reactions : sometimes they were followed by abdominal pain or vomiting, or transient severe headache. Detailed accounts are given of the temperature variations and changes in the constituents of the blood and in the size of the spleen. The two cases are of interest on account of their severity and of the large amount of drug administered over a considerable period without ill effect. *C. M. Wenyon.*

FEVERS OF THE TYPHUS GROUP.

Weiss, Lucile J. **Electron-Micrographs of Rickettsiae of Typhus Fever.** *J. Immunology.* 1943, Nov., v. 47, No. 5, 353–7, 24 figs.

Yolk-sac cultures of *Rickettsia prowazeki* with added formalin were ground and subjected to differential centrifugation. A drop of the suspension was placed on a collodion film and washed with distilled water. The organisms were photographed at a magnification of 6,000 diameters, and the photographs were enlarged so that the illustrations are at a magnification of 21,000 diameters.

The resultant images correspond with those obtained by Plotz and his collaborators [this *Bulletin*, 1943, v. 40, 685]. They show that the Rickettsiae are pleomorphic ; the large bacilliform types show the presence of a limiting membrane enclosing a substance of moderate opacity to electrons ; in some cases spherical granules are seen within the organisms. Some forms are completely opaque ; others are transparent. Dividing forms occur ; these are opaque when division is nearly complete.

Killed vaccines have also been photographed ; these contain complete Rickettsiae, but also many small granules resulting, presumably, from disintegration of the organisms, but possibly consisting of particles of protein or débris ; they vary in appearance according to the methods employed in preparing the vaccines.

[The electron-micrographs illustrated by Plotz showed sharper definition than those accompanying the present article.]

John W. D. Megaw.

Gaase, A. Titerschwankungen der Proteus OX_{19}-Agglutination nach Weil-Felix. II. Untersuchungen ueber die Ursachen der tageszeitlichen Titerschwankungen. [**Fluctuations in the Titre of the Weil-Felix Reaction. II. Investigation into the Causes of the Diurnal Fluctuations.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Sept. 8, v. 103, No. 5, 419–24, 14 figs.

The titre of agglutination of *Proteus OX19* is known to vary according to the reaction of the suspension. It is increased by a diet containing sugar, and is diminished or abolished by traces of corrosive sublimate, phenol, or formalin. It is raised by hydrochloric acid (1–3,000), and checked by carbonate of soda (0·5 to 1·0 per cent.).

In the present experiments guineapigs were given intracardiac injections of *Proteus OX19* in three increasing doses, and the resulting Weil-Felix reactions were tested over a period of three weeks in the animals, after fasting for 18 hours, and 6 hours after food.

In every case the titres were much higher after fasting ; for example a titre of 1–200 was often found in the fasting animal, against a negative reaction after food. The fluctuations that occur in the titre during the 24 hours must depend on the variations in the reaction of the blood caused by fasting and by food.

Guineapigs inoculated with killed *Proteus OX19* showed higher titres than those inoculated with living organisms. Animals fed entirely on lactose and galactose before being inoculated showed an earlier and higher rise in the titre than those fed on ordinary diets.

John W. D. Megaw.

León, A. P. & Apodaca, F. La reacción de Weil-Felix por el metodo rapido en lamina. Su valor diagnostico. [**The Diagnostic Value of a Rapid-Slide Modification of the Weil-Felix Reaction.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1943, Sept., v. 4, No. 3, 227–37, 1 fig. [14 refs.] English summary (9 lines).

The method employed was on the lines of the test introduced by Huddleson and Abell (1928) for the diagnosis of brucellosis. It is described in detail.

The results obtained with high-titre sera corresponded closely with those of the standard test. With low-titre sera there were considerable divergences in many cases. Extreme examples were—slide test, negative, as contrasted with a Weil-Felix titre of 1–160 ; and, slide-test titre, 1–50, against a Weil-Felix titre of 1–320.

The test is regarded as reliable, though it is less sensitive than the standard test for titres below 1–200, and on the whole it is rather less sensitive than the tube reaction.

John W. D. Megaw.

Bardhan, P. N., Tyagi, N. & Boutros, K. **Dry Blood Test for Typhus Fever. Preliminary Report.** *Brit. Med. J.* 1944, Feb. 19, 253–4.

A rough modification of Kudicke and Steuer's "dry-blood agglutination test" for typhus fever [see this *Bulletin*, 1942, v. 39, 372] was carried out on 640 Egyptian labourers from various military camps. Two drops of blood of unstated size, separated from each other by a grease-pencil stroke, were dried in the air on a glass slide. The slides were brought to the laboratory on the same day, and were examined within 24 hours. Drops of concentrated suspensions of *Proteus OX19* and *Pr. OX2* were placed on the blood films, left for a minute, and then well mixed with the films by gently rocking the slide. Mixing with a loop or other article was avoided. The slide was rocked occasionally for five to ten minutes, and the result was read with the naked eye or a pocket lens. The positive reactions with *Pr. OX19* were 13 ; of these, two reacted also with *Pr. OX2*. The positive cases were tested with the standard Dreyer technique for the Weil-Felix reaction ; 7 reacted with *Pr. OX19* at titres of 1–250 to 1–2,560 ; none reacted with *Pr. OX2* at titres higher than 1–50. Three of these seven reactors were found to be suffering from typhus, two were convalescents from the disease, and two were not subsequently traced (but were considered to have typhus on the basis of the Weil-Felix titres).

There was no explanation of the negative Weil-Felix response in the six other slide-positive cases.

Sera of 33 of the persons who were " slide negative " were subjected to the standard Weil-Felix test ; none reacted to *Pr. OX19* at a higher titre than 1–25.

From these findings, the authors conclude that " all typhus cases give a slide-positive result though a slide-positive result does not necessarily mean a positive case."

[This test has great possibilities, but it is desirable that the size of the drops of blood and suspension should be standardized, at least roughly. " The dry-blood test " would be a better name than " the slide test ", because there are several rapid tests that are carried out on a slide.] *John W. D. Megaw.*

LUMMERZHEIM, H. Hautreaktion bei Fleckfieber. [**A Dermal Reaction in Typhus Fever.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Sept. 8, v. 103, No. 5, 397–419, 2 figs. [21 refs.]

The author discusses the results of tests with the reaction described by GIROUD, who found that the intradermal injection of 0·1 cc. of typhus vaccine into typhus patients and convalescents caused the formation of a large patch of erythema up to 50 mm. in diameter, and reaching its maximum size in 28 to 52 hours. A patch of 9 mm. after 30 hours is regarded as positive. Mouse-lung vaccine supplied by Giroud was used in the present series of tests. In normal persons there is a small patch which reaches a maximum size of 4–5 mm. The reaction becomes positive about the 9th day of the fever and remains positive for at least a year.

Reactions in various groups of typhus patients and convalescents, also in controls, are shown in tabular form ; the readings after 24, 48, and 72 hours are given.

Among 73 typhus patients and convalescents the patches were 11–60 mm. in 66, and 6–10 mm. in 5, after 24 hours.

The titre of the Weil-Felix reaction, and the duration of convalescence, made no significant difference in the reaction ; six persons tested about a year after their attacks were still positive. Of 15 healthy controls two had patches of 11–20 mm. after 24 hours ; all were negative after 48 hours.

Five convalescents from trench fever were tested ; three had patches of 11–20 mm. after 24 hours, and one had a patch of 21–30 mm. after 48 hours. Of 10 persons who had been inoculated against typhus, four had patches of 11–30 mm. after 24 hours ; two had patches of 2–5 mm. ; and four of 6–10 mm. The reactions were rather less after 48 hours, and only one had a reaction of 11–20 mm. after 72 hours.

The reaction described by BISCHOFF following the use of louse vaccine, and found by him to be non-specific, probably results from the albuminous substances derived from the tissues of the lice rather than from the Rickettsial content of the vaccine. *John W. D. Megaw.*

KAMAL, A. M. & MESSIH, G. A. **Typhus Fever in Egypt. Statistical and Epidemiological, 1905–1942.** *J. Egyptian Pub. Health Ass.* 1943, Dec., 73–124, 12 charts & 2 maps.

The statistical records dealing with the incidence of louse-borne typhus in Egypt are discussed in detail. The earlier figures are grossly

inaccurate, for example a fatality rate of 78·6 per cent. is shown in 1907; with better, though far from perfect, notification the rate has fallen to about 15 per cent. in recent years.

The recorded yearly deaths per 100,000 of population show the variations in prevalence of the disease. In 1911–14 the figure was 15; in 1915–16 it was 45; and in 1919–20, 34. It then fell rapidly to the low figure of 1 for the years 1927–32; rose again to 7 in 1933–35; fell to 2 in 1936–38; and in the four years from 1939 onwards the figures have been 5, 5, 10, and 19. The rate for 1943 is not stated, but from a graph it appears to have been almost double that for 1942.

The disease is shown to have been endemic in Egypt from the earliest period at which records are available; it is regarded by the authors as being chiefly rural in its incidence, though the recorded yearly figures of deaths per 100,000 of population show considerable fluctuations. They are:—

	1921–25	1926–30	1931–35	1936–39
Urban	7·5	1·3	2·4	2·4
Rural	3·9	1·1	5·5	3·1

The disease is much more prevalent in Lower Egypt than in Upper Egypt, the annual attack rates have averaged 30 in the former and 6 in the latter from 1921 to 1939. The two Western-Deltaic Provinces, Behera and Gharbia, have been the most heavily affected parts of the country owing to the yearly immigration of labour forces to the large agricultural estates where the workers live in crowded and insanitary conditions.

The incidence and spread of the disease have been strikingly associated with the congregation of labour forces and with the return of infected persons to their homes. This feature of the disease is well seen in Upper Egypt where there is little typhus apart from that originating in connexion with dam construction and irrigation work.

The seasonal prevalence is remarkably uniform; cases begin to appear in November and increase steadily in number to a peak about the middle or end of April; the incidence remains high for about a month to six weeks. Towards the end of June there is a rapid fall, and there is a "dead period" from the end of August to the end of October.

In Upper Egypt the rise in incidence occurs rather later and is steeper; the decline is earlier and more abrupt. This difference is attributed by the authors to the importation of infection rather than to climatic conditions, because the prevalence in Lower Egypt begins to decline when the mean monthly temperature reaches 25 to 26°C. but remains high in Upper (South) Egypt while the temperature is nearly 30°C. The influence of climate on the incidence of the disease in Egypt deserves closer study; it is not likely that it can be stated in such simple terms as the mean temperature at a given time.

The prevalence of the disease since the outbreak of the present war is of special interest. The following figures show the number of cases notified in certain places:—

	Cairo	Alexandria	Suez Ports	Upper Egypt
1921 to 1939 (yearly average)	99	41	15	
1940	366	118	26	
1941	170	175	29	1,804
1942	2,245	522	281	3,234
1943 (till end of June) ...	7,778	1,258	1,453	7,119

Before workmen were recruited from Upper Egypt in this war the number of cases there never exceeded 700 in any year.

This paper will be of great interest to epidemiologists; in spite of the admitted unreliability of the notifications of the disease it shows clearly that typhus, in war and peace in Egypt, has conformed to the pattern observed in other countries in which the disease is endemic.

No cases of relapsing fever have been reported during the present war; in the period 1915–18 there were 36,343 cases.

John W. D. Megaw.

KAMAL, A. M. & MESSIH, G. A. **Typhus Fever. (Review of 11,410 Cases.) Symptomatology, Laboratory Investigations and Treatment.** *J. Egyptian Pub. Health Ass.* 1943, Dec., 125–85, 3 charts & 8 pls. Appendices I–IV, 186–96, 3 charts. Temperature charts of cases 197–213. [Refs. in footnotes.]

This investigation deals with 11,410 cases treated in various Egyptian hospitals during the years 1937 to 1942, and includes 2,106 cases under the care of the second author at the Tanta Fever Hospital near Cairo. There were 547 deaths among the 5,324 male patients, and 453 among the 6,086 female patients. The fatality rates in the different age groups were: 3·9 per cent. under the age of 20, rising steadily to 22 per cent. for patients of 35–45, and 55·7 per cent. for those over 55. The general rate was 13·38 per cent.; it was higher in males than in females at all ages, especially in the 25–35 group, in which it was 15·8 in males, and 9·98 in females.

The onset sometimes simulated malaria, meningitis, or influenza; persistent headache was a special feature. The tongue became brown-coated, dry, and cracked, in almost every case. When asked to protrude the tongue the patient "folds the tip—and then puts it out by jerks."

The pulse was rapid till early convalescence in most cases. Bronchitis of varying degree, with rapid respiration, occurred almost invariably.

There were great variations in the type and severity of the symptoms in the different local outbreaks; many types of fever curve were seen, these are well illustrated by a large series of temperature charts which form a valuable feature of the paper. The fever ended by crisis in 49·2 per cent.; by rapid lysis in 36·8 per cent.; and by slow lysis in 14 per cent. of the cases.

The frequency of the rash in different outbreaks seen by the same observer varied from 42 to 95 per cent. of the cases; in one outbreak it was as low as 32 per cent. The time of appearance ranged from the 2nd to the 10th day; it was between the 3rd and 6th day in nearly 80 per cent. of the cases with rash, but was on or after the 7th day in a considerable number. It was rare on the face and palms, and was best seen on the flexor aspect of the forearms. Petechiae were the most

characteristic and common forms, they were usually independent of the macules, but were sometimes superimposed on them.

The more severe nervous symptoms seldom appeared till the 2nd week except in alcoholic patients. Delirium, hallucinations, and delusions usually appeared late in the illness, but insomnia was an early feature. Deafness in some degree was always present, it never persisted longer than a month after defervescence.

The chief complications were bronchitis, bronchopneumonia, and lobar pneumonia; 13·7 per cent. of all the deaths were due to some form of pneumonia.

Parotitis occurred in 288 cases (2·54 per cent.), mostly in early convalescence; suppuration has become rare now that sulphonamides are used. Diarrhoea occurred in 125 cases, uraemia in 26, pharyngitis in 23, gangrene in 21, otitis media in 17, neuritis in 11, and cellulitis in 10. The low incidence of some of these complications is striking.

The incidence of pneumonias varied, in different outbreaks, from 1·7 to nearly 10 per cent.; it was much less in cases brought early for treatment.

Of 87 pregnant women 54 aborted, mostly in the 2nd week. The earlier the stage of pregnancy the more frequently abortion occurred.

In 684 cases at the Tanta Hospital Weil-Felix tests were carried out from the early stages; the reaction became positive within the first week in 30·7 per cent.; during the second week in 40·8; and in early convalescence in 14·1 per cent. It remained negative at the end of the third week in 14·3 per cent. The reaction is not considered to be absolutely diagnostic except in cases in which there is a titre rising to 1–500, but the titre which was regarded as positive in the above series is not stated. Among 639 cases in which the titre had been 1–250 or higher the reaction became negative 14 days after the end of the fever in 54·8 per cent.; in 13 per cent. the titre fell to 1–125, and in the rest it was still 1–250 or over. In 5 of 15 cases it was still positive after nine months, but was negative after 12 months.

In 70 cases at the Tanta hospital in which the titre to *OX19* was 1–250 or over there were reactions to *OX2* and *OXK* in only six, and in these the titre was 1–50.

A skin test is mentioned as being of great diagnostic value, but nothing is said of the stage at which it becomes positive. A loopful of a 24-hours' culture of *Proteus OX19* is suspended in 20 cc. saline and killed by heat; 0·2 cc. of this is injected intradermally; in normal persons this causes an indurated patch of erythema after 12 to 16 hours; in typhus patients there is no reaction.

About 26 per cent. of the deaths occurred after defervescence. No drug was found to have any specific action, though many were tried. No evidence could be found of the existence of "inapparent" cases; the carry-over of infection is believed to be by sporadic cases. There was no evidence of any outbreak having originated from flea-borne typhus.

The best way of destroying head lice was that suggested by Professor Buxton; the hair was well soaked with 2·5 per cent. carbolic acid and kept covered with a towel for two hours. *John W. D. Megaw.*

Brockbank, W. & Whittaker, S. R. F. **Notes on Typhus Fever in the Middle East.** *Lancet.* 1944, Jan. 29, 150–51.

Ten cases of louse-borne typhus fever were treated at a General Hospital in the Middle East during the three months, March to May

1943. The patients were British soldiers who had been in contact with civilian labour ; evidence of lice was found in only one case.

In 8 of the 10 patients typhus was not suspected till the appearance of the rash, which was on the fifth or sixth day. In two, the rash was not seen till the 10th day ; in these, the Weil-Felix reaction was the first diagnostic feature. Several other patients were admitted with a provisional diagnosis of typhus based on the association of multiple insect bites or a sweat rash with fever ; these cases turned out to be short fevers or malaria. Early differentiation of typhus from malaria, sandfly fever, relapsing fever or typhoid may be difficult to the inexperienced. [The authors might have gone so far as to state that even to the experienced, early diagnosis may be impossible in sporadic cases ; the importance of an attitude of watchful suspicion is clearly shown.] The typhus rash was of the usual type, it extended to the face in two cases, and a brown staining could be detected as late as the fourth or fifth week. The fever lasted 12 to 16 days and ended by rapid lysis, rather than by crisis. The pulse rate was 120 to 130 throughout the febrile period.

All the five patients under 30 years of age recovered ; two of the five older men died—one unexpectedly on the ninth day of heart failure, the other, on the 24th day, of pneumonia.

Recovery was slow, two of the patients were likely to be unfit for a considerable time.

The titres of the agglutination reactions to *Proteus OX19* and *Pr. OX2* up to the 15th day of the illness were as shown in the table.

Day of illness	5	6	7	7	8	8	8	9	9	9	10	11	12	14
Pr.OX19	0	0	0	120	120	480	1,920	480	0	960	240	30	60	120
Pr.OX2	60	0	0	120	60	60	30	960	30	60	120	0	960	480
Serial number of case	6	5	2	8	4	6	7	1	5	9	3	10	2	5

The titre rose to a higher level to *OX19* than to *OX2* in six cases ; it became higher to *OX2* in three cases, and in one it was the same to both on the seventh day ; this patient died two days later. In the other fatal case, no. 5, the reaction to *OX19* was 1–120 on the 19th day when it was 1–1,920 to *OX2*.

In six cases Rickettsial-agglutination tests carried out by Major VAN ROOYEN confirmed the diagnosis of louse-borne typhus.

John W. D. Megaw.

HEIMBERGER. Beobachtungen bei Fleckfieber. I. Mitteilung. Beitrag zur Frühdiagnose. 2. Mitteilung. Besondere intestinale Verlaufsformen des Fleckfiebers. [**Observations on Typhus. 1. Early Diagnosis. 2. Intestinal Forms.**] *Deut. med. Woch.* 1943, Sept. 3, v. 69, No. 35/36, 627–8 ; 628–9, 2 figs.

The roseola can be detected 12 to 14 hours before the usual time by applying the sleeve of a sphygomanometer to the upper arm for five to seven minutes at a pressure of 150 mm. Hg. Within less than two minutes after release of the pressure the spots can often be detected on the arm, though normally they cannot be seen at this site till one or two days after their appearance on the trunk. *John W. D. Megaw.*

YALUFF, E. & VERDAGUER, J. Fondo de ojo en el tifus exantematico. [**The Fundus Oculi in Exanthematic Typhus.**] *Bol. Med. Social.* Santiago de Chile. 1942, Oct., v. 9, No. 100, 589–92, 3 figs.

The lesions of the fundus oculi now described were first discovered by A. SCHWEITZER of Rio de Janeiro in 1934, and an account of them was given by R. KINAST in a doctorâte thesis.

They consist of white, refractile or milky, minute spots with well-defined edges, sometimes surrounded by a red zone. They are situated on the vessels or at some distance from them, and are scattered over the whole area of the fundus, especially towards the periphery where they are first seen. They are situated either in the retina or deeper, in the choroid. They usually make their appearance at the end of the febrile period, but are sometimes seen earlier. They last for 8 to 20 days and do not produce any symptoms.

The number of cases in the present series is small and does not justify the use of percentages to designate their frequency of incidence.

The figures are :—Febrile stage, 3 positive in 6 cases ; defervescent stage, 1 positive, the only case examined ; convalescent stage, 2 positive in 9 cases. The cases were of a mild type. The differentiation from tuberculous nodules is easy.

When found they are absolutely diagnostic, and surprise is expressed at their having been overlooked by previous observers.

Kinast found them in 80 per cent. of his cases.

John W. D. Megaw.

MACCHIAVELLO, A. **Investigations of Chilean Exanthematicus Typhus and Experimental Exanthematous Typhus.** *Proc. 6th Pacific Sci. Congr. 1939.* Berkeley, Calif. 1942, v. 5, 649–75. [58 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Jan., v. 32, Pt. 1, 12–13.]

Typhus is endemic in Chile, and epidemics have occurred from time to time, including a serious one that broke out in 1932 and spread to all provinces. All developed in spring and summer except one in Valparaiso in 1937. The epidemiology is discussed, and an account is given of various experiments connected with it, including many on the infectivity to guineapigs of lice [*Pediculus humanus*, L.] collected from typhus patients and contacts. Inoculation of lice from serious, moderate and mild cases gave positive results in 56·1, 30·7 and 17·8 per cent. of the tests, respectively. Positive results were obtained with lice taken from light cases from the sixth to the tenth days of illness, from cases of medium severity from the fifth day onwards and from severe cases throughout illness, but in greatest proportion from the ninth to the eleventh days. As death usually occurs in severe cases in 12–14 days, lice leave the body and seek new hosts when they are most infective. This accounts for the numerous cases contracted at the funerals of typhus patients. The importance of the early isolation of severe cases is pointed out. Lice taken from a woman two months after convalescence were infective, though her blood could not be proved infectious and experiments on the infection of lice by feeding them on the blood of convalescents were negative, which suggests that infected lice may live longer than is generally supposed. Details are given of the finding of infected lice on 19th August and 10th September 1938 on a person who had been in contact with a severe case earlier in August, had no history

of having had typhus previously, did not develop it and showed no evidence of immunity. Lice taken from him in February were not infective, and healthy lice fed on him did not become so. Guineapigs developed typhus as a result of the inoculation of either live or dead lice taken from the mattress of a typhus patient 25 days after his removal to hospital.

A brief account is given of the benign endemic typhus of Antofagasta. The sick were usually free from ectoparasites. Rats were proved to be reservoirs, and the disease was transmitted from rat to rat by *Polyplax spinulosa*, Burm., and *Xenopsylla cheopis*, Roths. Experiments with *Cimex lectularius*, L., *L*[*eptopsylla*] *segnis*, Schönh. (*musculi*, Dugès), *Echidnophaga gallinacea*, Westw., *Pulex irritans*, L., *Liponyssus bacoti*, Hirst, and *Echinolaelaps* (*Laelaps*) *echidninus*, Berl., were negative. Examples of *Dermacentor*, *Ornithodoros*, *Rhipicephalus sanguineus*, Latr., and *Ctenocephalides* (*Ctenocephalus*) *canis*, Curt., collected from dogs were not infected.

Segal, A. E. & Zasosova, L. I. [**Repeated Illnesses with Typhus Exanthematicus.**] *Klinicheskaya Meditsina.* Moscow. 1943, v. 21, No. 3, 64–7. [In Russian.]

During recent years the authors have noticed an increase in repeated attacks of typhus. During four years (1936–39) they have had 119 examples of second attacks, which constitute 31·2 per cent. of the total cases of typhus seen; 76·1 per cent. of the second attacks have occurred between the ages of 26 and 50. The average interval between the first and second attacks was 12–18 years. It has been proved in guineapigs that immunity to typhus varies greatly, and it seems that in man immunity is far from absolute.

Comparing the second attacks with first, the authors conclude that the clinical picture, and the condition of the blood and serum, are somewhat different. On the whole, there are many more mild and indefinite cases in second attacks and the mortality is lower. The cardiovascular system is less often affected in second attacks (46·2 per cent.), and the same applies to the central nervous system. Usually a leucocytosis is claimed to be present in all cases, but the authors' experience was: a leucopenia in 34·8 per cent., a normal count in 26·8 per cent. and a leucocytosis in 19·5 per cent. The Weil-Felix reaction was found positive in only about 20 per cent. of cases, after repeated attempts. In 18 per cent. *Bact. typhosum* and *Bact. paratyphosum B* were agglutinated. Complications (broncho-pneumonia and pyelitis) occurred in 19 per cent. of cases; only 5·8 per cent. had no rash. *H. W. Swann.*

Hase, A. Ueber Entlausung durch Ameisen sowie ueber die Wirkung der Ameisensäure auf Kleiderläuse. [**Delousing by Ants and the Action of Formic Acid on Clothes Lice.**] *Ztschr. f. Parasitenk.* 1942, v. 12, Pt. 6, 665–77, 7 figs. [Summary taken from *Rev. Applied Entom.* Ser. B. 1943, Dec., v. 31, Pt. 12, 235.]

The use of ants to destroy *Pediculus humanus*, L., in clothing is an old practice in Germany, and in experiments with artificially infested fabrics placed on nests, all lice, eggs and excreta were removed or eaten in 24 hours by *Lasius fuliginosus*, Latr., while *L. flavus*, L., cleared off all the lice and nearly all the eggs. *Formica rufa* var. *rufopratensis*,

Forel, destroyed the lice, eggs and excreta but damaged the fabric. Such treatment is uncertain, however, and is ineffective if the lice are protected by folds in the material. The author also examined the toxic effect on lice of formic acid, in view of a recent recommendation in Germany that clothes should be treated with a preparation containing 25–27 per cent. of the acid and sold as Formazin. The lice were killed by immersion for 10 minutes in a 25 per cent. solution of the acid, but some eggs survived 20 minutes' immersion ; and exposure to a high concentration of the vapour of formic acid killed the lice in three hours, but not the eggs. Acetic acid gave similar results. It is concluded, therefore, that formic acid is not suitable for the treatment of clothing, especially as there is danger of skin irritation from its use.

PENFOLD, J. B. **Vaccination against Typhus Fever.** *Brit. Med. J.* 1944, Jan. 22, 114.

The Proteus-agglutination titres of 23 healthy persons were tested before and after vaccination with the usual three doses of Cox's egg-yolk vaccine. They were also tested after revaccination three months later with a single dose of 1·0 cc. of the same vaccine.

The positive results at the titres indicated are shown in the table ; the reactions were negative or at lower titres in the other cases. All the 23 persons were tested on each occasion.

	Before vaccine	2 weeks after vaccine	3 months after vaccine	2 weeks after revaccination
Pr. OX19 (1–20 to 1–160)	3 (all 1–20)	13	8	19
Pr. OX2 (1–20 to 1–80)	1 (1–20)	10	2	12
Pr. OXK (1–80 to 1–640)	8 (maximum 1–160)	22	2	5

With *Pr. OXK*, 20 of the 23 reacted at titres ranging from 1–20 to 1–160 before vaccination, the commonest titre was 1–40.

The titre for *OX19* rose by more than 100 per cent. after primary vaccination in 14 cases, and after revaccination in 17 cases.

The reactions to the vaccine were slight in most cases, and they became progressively milder after each successive dose.

The vaccine was issued from the Connaught Laboratories, Toronto, on November 4th, 1941. *John W. D. Megaw.*

PATEL, N. D. **Endemic Typhus Fever in Bombay City. A Report of Six Cases with Demonstration of Neill-Mooser Reaction and Rickettsiae from One Case.** *Indian Physician.* 1943, Nov., v. 2, No. 11, 384–99, 7 figs. (4 on 1 pl.). [10 refs.]

Six sporadic cases of endemic typhus are described ; they occurred in Bombay City between July and October 1943. With the cases reported by T. B. PATEL in 1939–40 [this *Bulletin*, 1940, v. 37, 840 ; *Indian Med. Gaz*, 1940, v. 75, 650], and by J. C. PATEL early in 1943 [this *Bulletin*, 1944, v. 41, 118], there are now records of 26 cases in Bombay ; two of these were fatal.

From one of the patients in the present series Rickettsiae have been recovered by inoculation of blood, taken on the 9th day, into a guineapig which had been kept on a vitamin-deficiency diet. There was a positive scrotal reaction in the animal. From a mouse, inoculated

on the same day, the infection was passaged to a guineapig, which also developed a scrotal reaction ; Rickettsiae were found in large numbers in scrapings of the tunica vaginalis of the guineapig.

Guineapig inoculation with blood taken from another patient, on the 14th day of the illness, gave no reaction.

The *Proteus OX19* titres ranged from 1–50, on two separate occasions in the one fatal case, to 1–2,500, on the 12th day, in the patient from whom Rickettsiae were isolated ; it was 1–250 or 1–500 in the other cases. In the fatal case the *OXK* titre was 1–250 ; this patient was a girl of 14 ; her leucocyte count ranged from 3,200 to 4,900 ; she died on the 27th day, of pneumonia.

The author believes that all the conditions for a serious epidemic of louse-borne typhus exist in Bombay ; he states in italics that a mere accident of a louse-infested man being infected with murine typhus may start such an epidemic.

[On the other hand it seems likely that flea-borne typhus may have been prevalent for an indefinite period in Bombay and many other places in India without having given rise to an epidemic of louse-borne typhus. The remarkable freedom of the greater part of India from the louse-borne disease has not yet been accounted for.]

John W. D. Megaw.

Bejarano, J. F. R. Rickettsiosis de la provincia de Santa Fe. [**Rickettsiasis of the Province of Santa Fe (Brazil).**] *Primer Congr. Nac. Enfermedades Endemo-Epidemicas, Buenos Aires,* ***1942, Nov. 9–13.*** 187–93, 1 map. [24 refs.]

Occasional cases of typhus fever have been reported from San Martin in the Province of Santa Fe since 1936, but the first confirmed cases were in 1940. In one of these the Weil-Felix titre to *Proteus OX19* was 1–200 ; in the other it was 1–1,000 ; the reactions to *OX2* and *OXK* were negative in both. Altogether, 33 cases have been reported during the six years 1937 to 1942 from a restricted area within a radius of 40 kilometres. The inhabitants were cleanly and well nourished ; lice could be excluded, so that fleas and ticks were the only arthropods that could be suspected of being vectors. In the cases investigated at the Bacteriological Institute at Buenos Aires the Rickettsiae were regarded as being of the murine type.

The author prefers to call the disease " Rickettsiosis " rather than " exanthematic fever " or " exanthematic typhus," and he adopts the classification according to the four arthropod vectors. He goes on to subdivide the tick-borne fevers into two groups, the American, and the African-Mediterranean.

He implies that the tick-borne disease does not occur in the Asiatic region.

John W. D. Megaw.

Sordelli, A., Manzullo, A., Riessel, M. & Ferrari, J. Resultados de la inoculación experimental con sangre de enfermos, organos de ratas, con pulgas y con artropodos. [**Results of Experimental Inoculation with the Blood of Patients, the Organs of Rats, Fleas, and other Arthropods.**] *Primer. Congr. Nac. Enfermedades Endemo-Epidemicas, Buenos Aires,* ***1942, Nov. 9–13,*** 194–9.

Rickettsiae were isolated from 6 of 13 patients in whose cases the diagnosis of typhus fever was clinically confirmed ; the patients came from Buenos Aires, Santa Fe, and Córdoba.

Guineapigs were the animals chiefly used for the inoculation experiments, and in them the reactions were unusual for strains of Rickettsiae of the murine type. Among 86 guineapigs inoculated with material known to be infective the Neill-Mooser scrotal reaction was positive in only six cases; the usual response to inoculation was negative so far as a febrile or other apparent reaction was concerned, and when fever occurred there was only a fleeting slight rise in temperature.

By intraperitoneal inoculation of rats with blood on successive days Rickettsiae were obtained in the tunica vaginalis, but even with scrapings from this material rich in Rickettsiae it was not possible to passage the infection through guineapigs with regularity or to produce a scrotal reaction.

Three of the positive results were in patients from whom the blood was taken on the 13th to the 22nd day and the Weil-Felix titres to *OX19* were 1–500 to 1–1,000. In the other three cases the blood was taken on the 4th to the 6th day, and the Weil-Felix reaction, presumably tested on the same days, was still negative.

Evidence was obtained that Rickettsiae could be isolated more readily from rat fleas than from the rats that harboured the fleas.

In the cases from which Rickettsiae could not be isolated the blood was taken between the 7th and 13th days; the Weil-Felix titre was 1–200 in three; 1–1,000 in three; and not stated in the remaining case.

[This is another group of cases in which the results of animal experiments were ambiguous. It would be interesting to test the sera of the patients by the Rickettsia-agglutination and the complement-fixation reactions.] *John W. D. Megaw.*

i. Sosa, H. & Vidal de Gambino, R. Resultados de la investigación sistematica de aglutinas para Proteus X 19. [**Results of a Systematic Investigation of the Agglutination of** *Proteus X19.*] *Primer Congr. Nac. Enfermedades Endemo-Epidémicas, Buenos Aires, 1942, Nov. 9–13.* 207–10, 1 chart.

ii. —— & ——. Resultados de la investigación sistemática de aglutininas para Proteus X 19. *Rev. Inst. Bacteriológ. "Dr. Carlos G. Malbran."* Buenos Aires. 1943, Sept., v. 11, No. 4, 429–33, 1 chart.

i. Altogether 16,750 sera were tested, first by a rapid simple method, to pick out the positives, then the titres were determined in the positive cases by the standard test. There were 130 positive reactions of which 106 occurred during three years 1940 to 1942.

Every sample of serum sent to the laboratory for the investigation of a febrile illness was tested from the year 1934 onwards; the percentage of positive reactions to *Proteus OX19* ranged from 0·23 in 1937 to 2·0 in 1942. Of the positive cases 61 came from the City of Buenos Aires, 35 from the Province of Santa Fe, and 16 from the Province of Córdoba. The rest were from six different Provinces of Brazil.

The reactions at titres of 1–50 and 1–100 were 29; at 1–200, 24; at 1–500 to 1–1000, 40; and at higher titres, 37.

The method employed in carrying out the rapid test is described, but the great increase in the number of positives from 1940 onwards, and especially during the first seven months of 1942, is not discussed. During these seven months there were 38 positive findings.

The only reference to the type of disease in which the reactions occurred is contained in the introductory paragraph in which the work is stated to be a contribution to the study of endemic typhus.

ii. This is an account of the same work. *John W. D. Megaw.*

SORDELLI, A., MANZULLO, A., RIESEL, M. A. & FERRARI, J. Tifus exantemático. II. Virus de las pulgas de ratas de la ciudad de Buenos Aires. [**Exanthematic Typhus. The Organism in Rat Fleas in Buenos Aires City.**] *Rev. Inst. Bacteriológ. "Dr. Carlos G. Malbran."* Buenos Aires. 1943, June, v. 11, No. 3, 272–85, 5 text figs. & 4 figs. on 2 pls.

Rickettsiae were isolated from 6 of 12 lots of suspensions of *Xenopsylla cheopis* found on rats caught in granaries situated in localities where cases of murine typhus had occurred.

All the fleas from each locality were ground up together and inoculated into white rats, from which, 12 to 19 days later, brain substance or this with vaginal scrapings were used for the inoculation of guineapigs or irradiated rats.

The results were highly irregular, just as were those obtained by the authors in their experiments with the blood of patients [see this *Bulletin*, 1943, v. 40, 385.]

Altogether 23 sets of passages were made; from six of these Rickettsiae were isolated; in four the results were doubtful, and in 13 they were negative. Thermal reactions, over 40°C., occurred in 52·4 per cent. of the 69 guineapigs of the 13 negative sets of passages, and in 51·3 per cent. of the 86 used in the six fully positive series.

There were only eight scrotal reactions among the 86 animals of the positive series. The thermal reactions that did occur were irregular in their duration and in the incubation period; there was no regular association between their occurrence and the scrotal reactions.

Rickettsiae were recovered directly from the vaginal scrapings of only one of the eight guineapigs with scrotal reactions, but irradiated rats inoculated intraperitoneally with daily doses of the blood of these animals yielded abundant Rickettsiae in four series of passages and scanty doubtful rickettsiae in five other series.

The significance of the remarkably low virulence of the Rickettsiae to the local guineapigs is discussed. The local animals appear to offer a high degree of resistance, as is shown by the fact that infective material derived from two guineapigs sent from Santiago after inoculation with a typically orchitic strain of Rickettsiae gave the same feeble and irregular results in the local guineapigs as were observed in animals inoculated with the local strains. *John W. D. Megaw.*

i. SORDELLI, A., MANZULLO, A., RIESEL, M. A. & FERRARI, J. Tifus exantemático. III. Virus de las pulgas y ratas del foco de Ucacha, Pcia. de Córdoba. [**Exanthematic Typhus. Virus in Fleas and Rats from the Infected Focus of Ucacha.**] *Rev. Inst. Bacteriológ. "Dr. Carlos G. Malbran."* Buenos Aires. 1943, June, v. 11, No. 3, 326–48, 4 figs. on 2 pls. & 2 text figs. [24 refs.]

ii. ——, ——, —— & ——. Breve estudio de un foco rural de tifus exantematico. [**A Brief Study of a Rural Focus of Exanthematic Typhus (Flea-borne).**] *Primer Congr. Nac. Enfermedades Endemo-Epidemicas, Buenos Aires, 1942, Nov. 9–13.* 202–4, 1 fig.

i. A remarkable outbreak of a mild form of endemic, flea-borne, typhus is reported from Ucacha in the Province of Córdoba in Brazil.

In a house of eight rooms in a once prosperous, but now depressed, agricultural colony, 7 of the 12 adult residents were attacked between March 1st and May 3rd, 1943. Seven children under five years of age escaped.

The incidence according to the rooms occupied and the dates of onset was: Room 2, two cases, March 1 and April 5; Room 3, two cases, April 12 and 18; Room 4, two cases, April 12 and 15; Room 8, one case, May 3. The only persons occupying these rooms who escaped were three children aged 1, 3, and 4 years. The nine persons living in the other rooms were not attacked, and no other cases occurred in the locality.

The house was heavily infested with rats, which made their nests under the wooden floors. There was no infestation with lice, but bed bugs were plentiful.

Between April 29 and May 6 about 40 rats were trapped in the house and 255 fleas (*Xenopsylla cheopis*) were collected from them.

Rickettsiae were isolated from six lots of pooled rats, each lot consisting of one to five rats, and from four lots of fleas, each lot consisting of 14 to 116 insects.

The investigation was carried out on the same lines as described in the above article by the same authors, and the findings were very similar. A scrotal reaction occurred in 12 of 122 guineapigs inoculated with material from rats known to be infective, and in five of 58 animals inoculated with material from fleas known to be infective.

ii. This paper refers to the same outbreak. *John W. D. Megaw.*

Sordelli, A., Manzullo, A., Riesel, A. & Ferrari, J. Tifus exantemático. IV. Infección Polyplax sp. y *Cimex lectularius* con Rickettsiae. [**Exanthematic Typhus. Infection of** *Polyplax* **sp. and** *Cimex lectularius* **with Rickettsiae.**] *Rev. Inst. Bacteriológ. "Dr. Carlos G. Malbran."* Buenos Aires. 1943, Sept., v. 11, No. 4, 381–4, 1 coloured pl.

From a pooled suspension of 30 lice from a rat trapped in Buenos Aires, Rickettsiae were isolated in an irradiated rat belonging to a series of 36 animals (guineapigs and rats) used for the passage of the infection. A rat also gave a positive Weil-Felix reaction. Fleas from the same rat gave negative results on inoculation.

Rickettsiae were also isolated from bed bugs collected on April 30th from the beds of two patients during the Ucacha outbreak described in the preceding article. Rickettsiae from tunica smears made from an irradiated rat which developed a scrotal reaction are shown in a coloured plate.

These findings are not regarded by the authors as being of great practical importance. *John W. D. Megaw.*

Briceño Iragorry, L. Comprobación de la *Rickettsia prowazeki* var Mooseri, en el cerebro de ratas de la región caraqueña. [**Confirmation of the Presence of** *Rickettsia prowazeki* **var.** *mooseri* **in the Brain of Rats in Caracas, Venezuela.**] *Gac. Méd. de Caracas.* 1943, Sept. 15, v. 50, No. 17, 187–9.

All the previous attempts by the author to isolate the Rickettsiae of the cases of murine typhus in Caracas have been unsuccessful owing to the late stage at which the patients came under observation.

Investigation of the rats of infected localities also gave negative results except that the Weil-Felix reaction was found to be positive in 6·2 per cent. of the animals.

During the early months of 1943 the brains of 125 rats from infected localities have been examined by guineapig and rat inoculation.

Rickettsiae were isolated from one rat (*Rattus norvegicus*) and were passaged through a white rat and two guineapigs, all of which showed scrotal reactions. Rickettsiae were demonstrated in tunica smears of the infected guineapigs. *John W. D. Megaw.*

GIBBONS, R. J. **Rocky Mountain Spotted Fever in Canada.** *Proc. 6th Pacific Sci. Congr. 1939.* Berkeley, Calif. 1942, v. 5, 573–5. [Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Jan., v. 32, Pt. 1, 10–11.]

Of the 12 authenticated cases of Rocky Mountain spotted fever that have been recorded in Canada, three occurred in British Columbia in 1917 and 1936, eight in Alberta in 1923, 1935, 1936 and 1938, and one in Saskatchewan in 1929. There have been several other cases with clinical histories suggestive of this disease. *Dermacentor andersoni*, Stiles, is abundant in the dry belt of British Columbia east of the Coast Range and throughout southern Alberta and south-western Saskatchewan and has been recorded from Manitoba. It is slowly spreading westwards in British Columbia. It becomes active in late March and remains so for 1–3 months according to district. No cases of Rocky Mountain spotted fever have been recorded from eastern Canada, although *D. variabilis*, Say, which transmits it in the eastern United States, is found in Manitoba, parts of Saskatchewan, and a few districts in Ontario and has been reported as far east as Labrador. *Haemaphysalis leporis-palustris*, Pack., believed to be of importance in the maintenance of *Dermacentroxenus rickettsi* in animals, is the most widely distributed tick in Canada, and individuals collected in northern Manitoba induced reactions indicative of low-grade Rocky Mountain spotted fever in guineapigs. During the spring and early summer of 1938 and 1939, 29,500 and 22,600 ticks, respectively, nearly all *Dermacentor andersoni*, were collected in southern British Columbia and southern Alberta. No infections with Rocky Mountain spotted fever were found in those collected in 1938, but typical strains of virulent *Dermacentroxenus rickettsi* were demonstrated from five out of about 300 lots, comprising 9,000 ticks, in 1939. All the positive ticks came from an area in south-eastern Alberta where fatal human cases had occurred in 1935 and 1936, though the negative ticks of the previous year had included many from this district. Tularaemia bacteria were isolated from several of the ticks in both years.

VARELA, G. & MAZZOTTI, L. Conservación del virus del tifo en *Triatoma barberi* Usinger, 1939. [**Survival of the Typhus Virus in *Triatoma barberi*, Usinger 1939.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1943, Sept., v. 4, No. 3, 211–13. English summary (3 lines).

Twenty *T. barberi* which had fed on a guineapig infected with an orchitic strain of Rickettsiae were triturated on " successive days " and injected intraperitoneally into guineapigs.

The results were somewhat irregular, but the last guineapig, inoculated on the 33rd day, had a short febrile attack and was found to be immune

to the same orchitic strain, so that the virus was shown to be capable of survival in the insect for at least 33 days. *John W. D. Megaw.*

DAVIS, G. E. **Studies on the Biology of the Argasid Tick, *Ornithodoros nicollei* Mooser.** *J. Parasitology.* 1943, Dec., v. 29, No. 6, 393–5.

"The argasid tick *Ornithodoros nicollei* found in the states of Guerrero, Puebla, Colima and Jalisco, Mexico, feeds, naturally, on *Neotoma*, man, and dogs. It also feeds readily on laboratory animals. Feeding is rapid with the exception of *some* larvae which may require several days to complete engorgement. Males mature first. There are from 4 to 6 nymphal stages. Based on 42 counts, the number of eggs varied from 184 to 631. The number of eggs increases from the first to the third or fourth oviposition. There is a tendency to oviposit a second time without further feeding. Fertility was as high as 98 per cent. in females that had not mated for at least one year.

"Ticks of this species experimentally transmit the rickettsiae of the spotted fevers of the United States of America, Colombia, and Brazil with marked facility. Transmission through the egg was demonstrated in Brazilian and Colombian spotted fever. *Rickettsia diaporica* and *Pasteurella tularensis* are not transmitted by bite but are conserved for long periods in the tissues of the tick as demonstrated by injection."

DAVIS, G. E. **Experimental Transmission of the Rickettsiae of the Spotted Fevers of Brazil, Colombia, and the United States by the Argasid Tick** *Ornithodoros nicollei. Pub. Health Rep.* Wash. 1943, Nov. 26, v. 58, No. 48, 1742–4.

Eight lots, each consisting of 20 to 76 specimens, of the tick *Ornithodorus nicollei* were fed at the first-nymph stage on guineapigs infected with the spotted fevers of Brazil, Colombia, and the United States, respectively.

Some of the engorged nymphs belonging to six of the eight lots transmitted infection to fresh guineapigs by their bites. The scrotal reaction was caused in about one-third of the infected guineapigs, and all the infected animals that were tested were found to have acquired immunity to the spotted fever of the United States.

Transmission of infection through the egg was demonstrated in ticks infected with the Brazilian and Colombian strains of Rickettsiae. The larval offspring of the infected ticks appeared to be more effective transmitters than their parents; they caused more severe attacks and attached themselves more firmly to the guineapigs.

O. nicollei is a Mexican species and is parasitic on man and dogs so that it seems hardly credible that Mexico should be free from the tick-borne spotted fever which has so wide a distribution in North and South America, yet no cases of the disease have yet been reported from Mexico.

This report, like the others from the Rocky Mountain Laboratory, gives a highly condensed but clear account of a large series of carefully conducted experiments, so that its readers will observe with regret a hint that the work has been interrupted, probably owing to the exigencies of war.

[The nomenclature of the tick-borne fever of the typhus group prevalent in so many parts of the American Continent ought to be unified, and it is to be hoped that a suitable descriptive name will be selected.

So long as North American workers adhered to the name Rocky Mountain spotted fever it would have been tactless to advocate a change, but now that the Rocky Mountain experts themselves show a tendency to discard the time-honoured name and to adopt one indicating that the disease has a wider range, they might be prepared to consider the advantages of a suitable descriptive name which would be applicable to the disease wherever it occurs. At present upwards of 20 different names are used from time to time for a disease which has been shown to be one and the same. My own suggestions would be "American tick typhus" or "tick typhus of the Rocky Mountain type." Although the latter name is longer it has the great advantage of retaining the association with the classical type of the disease.]

John W. D. Megaw.

BUSTAMANTE, M. E. & VARELA, G. Una nueva rickettsiosis en Mexico. Existencia de la fiebre Manchada Americana en los estados de Sinaloa y Sonora. [**A Rickettsial Disease new to Mexico. Rocky Mountain Spotted Fever in the States of Sinaloa and Sonora.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1943, Sept., v. 4, No. 3, 189–210, 1 map, 4 graphs & 2 coloured figs. on 1 pl. [12 refs.] English summary.

A severe fever has been known for many years near the West Coast of Mexico; it went by the names "fever of Choix" or "pinta fever" (spotted fever). In 1925 it was suspected by HOFFMANN to be Rocky Mountain spotted fever, but after investigation the opinion was formed that it was of a different type and the name "spotted fever of Choix" was adopted.

In 1943 an investigation was started in the States of Sinaloa and Sonora, situated about 108°W. of Greenwich and 26°N. latitude.

From August till December 1942, 79 cases of "pinta fever" with 50 deaths were reported from these States; no cases occurred from the end of January till late July, this being the dry season when agricultural operations were not in progress so that the inhabitants were not brought into contact with ticks.

During the first six months of 1943 many ticks were collected; 2,190 were triturated and injected intraperitoneally into 176 guineapigs, but clear evidence of infection has not yet been obtained. Further investigation of the ticks is proceeding.

A patient was attacked in July 1943 with the usual symptoms; on the 13th day of the illness two guineapigs were inoculated intraperitoneally, each with 5 cc. of the patient's blood; the animals developed fever and orchitis and the infection was passaged through other guineapigs.

Guineapigs vaccinated 71 days beforehand with 1·0 cc. of Cox's vaccine against Rocky Mountain fever were found to be immune againt infection.

From these experiments it was concluded that the disease was the same as Rocky Mountain spotted fever, and in view of the discovery of the existence of this disease in Brazil, Colombia, Texas, and now in Mexico, it is suggested that a suitable name is American spotted fever.

[The new name proposed by the authors is only slightly less unsuitable than the original title, which has become established by many years of use, and is not likely to be abandoned without a struggle.]

John W. D. Megaw.

ANIGSTEIN, L. & BADER, M. N. **Preliminary Report on Investigations of Bullis Fever.** *Texas Reports on Biol. & Med.* 1943, v. 1, No. 3, 298.

The authors refer to Bullis fever [see this *Bulletin*, 1944, v. 41, 34, 209] and report that from a collection of 500 *Amblyomma americanum* a strain of an infectious agent was established in guineapigs. An intracytoplasmic Rickettsia was found, and guineapigs convalescent from infection induced by ticks were immune to reinfection with a human strain of the Bullis fever Rickettsia, but were not immune to Rocky Mountain fever and Q fever strains. It seems probable, therefore, that the Rickettsia now isolated from the ticks is the cause of Bullis fever.

Charles Wilcocks.

ANIGSTEIN, L. **The Problem of the Etiology of Tropical Typhus in Malaya.** *Proc. 6th Pacific Sci. Congr. 1939.* Berkeley, Calif. 1942, v. 5, 619–22. [Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Jan., v. 32, Pt. 1, 11.]

The greater part of this report deals with the author's own investigations on the causal agent of the rural form of Malayan tropical typhus, which was later shown to be identical with tsutsugamushi disease. He discusses the relation between typhus rickettsiae and *Proteus X* and inclines to the view that they are the parasitic and saprophytic stages of the same organism, but is undecided as to whether the transformation to the saprophytic phase takes place as the result of a possible life-cycle of the rickettsia or whether the proteus appears as an abrupt mutation. Although the human louse [*Pediculus humanus*, L.] plays no part in transmission of the Malayan disease, investigations were carried out to determine whether it could be artificially infected and so be used as a biological medium and the appearance of the organism in it compared with that of cultures on artificial media. Some 2,000 lice were, therefore, imported and infected by feeding or by anal injection. Minute dumb-bell shaped diplococci and delicate rods, as well as coccobacilli showing bipolar staining, could be found in masses in gut smears after eight days of feeding, and still more conclusive results were obtained by inoculation of patients' blood, which resulted in the appearance of enormous numbers of organisms resembling the rickettsiae of tsutsugamushi disease in morphology and staining properties. Organisms of the same type were demonstrated in the tunica vaginalis of guineapigs and rats inoculated with the gut emulsion of artificially infected lice. There was no evidence that multiplication took place intracellularly. Cultures of strains from man, rodents and lice on Hottinger broth and chocolate blood agar were highly pleomorphic and had pathogenic properties correlated with their morphological type. These phenomena, together with their serological properties suggested that they were biological phases of the tsutsugamushi rickettsia, one of them being the saprophytic proteus type.

MORISHITA, K. **Tsutsugamushi Disease: its Epidemiology in Formosa.** *Proc. 6th Pacific Sci. Congr. 1939.* Berkeley, Calif. 1942, v. 5, 639–47. [11 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Jan., v. 32, Pt. 1, 12.]

The epidemiology of tsutsugamushi disease on the main island of Formosa and in the Pescadores Islands is discussed separately on the

basis of new data from various sources, including the author's own observations. The disease is widely distributed on the main island, in the mountainous regions (6,500 ft. above sea level) as well as in the plains, but the endemic areas are more or less localised. It occurs throughout the year, but chiefly between June and October, and is contracted mainly by adult males in the course of work in the fields. Between 1933 and 1938, the incidence showed a tendency to decrease. The percentage mortality for this period was 12. The only known vector is *Trombicula akamushi*, Brumpt, which feeds on man and other mammals, chiefly rats and mice, and also birds, during the larval stage. The eggs are laid in the ground. The causal organism of the disease is passed from the larvae of one generation to those of the next. It is thought that not all the hosts of the mite can act as reservoirs of the disease. The most important are probably *Mus* (*Rattus*) *losea* and *Apodemus agrarius*. The correct specific name for the *Rickettsia* that causes tsutsugamushi disease is discussed. The Formosan rickettsiae are morphologically identical with those of northern Japan but show some biological differences, particularly as regards their behaviour in rabbits, in which scrotal swelling has never been observed by the author. It is difficult to detect the rickettsiae from Formosan cases unless mice are used. The author is of the opinion that the Formosan type may be a variety or at least a local variation of tsutsugamushi disease.

The disease was discovered in the Pescadores Islands in 1931, but was certainly present earlier. It is contracted from April to November in areas surrounding human dwellings, and is most prevalent in children. The percentage mortality for all observed cases was only 5·6. It is not known to be contracted in fields remote from habitations as it is in the main island, probably on account of the peculiar meteorological conditions. A very strong monsoon carrying salt spray blows during the winter and causes plants to wither unless they are artificially protected. For this reason, the inhabitants protect some area near their homes with coral walls. *Mus* (*R.*) *rattus rufescens*, *M.* (*R.*) *norvegicus* and *M. musculus taiwanus* live in or near the dwellings and these walls, and *Trombicula akamushi* develops in the ground inside the walls. *M. r. rufescens* has been found heavily infested by the mite and rickettsiae have been demonstrated in its tissues.

DENGUE.

CAVANAGH, J. R. **Dengue. Observations on the Disease as seen in the South Pacific Area.** *War Medicine.* Chicago. 1943, Dec., v. **4**, No. 6, 549–55, 3 charts.

In a large series of cases of dengue in the South Pacific the following symptoms were observed (the figures in brackets are percentages) :— Backache, usually persistent, (92) ; retro-bulbar pain (88) ; severe frontal headache (86) ; periarticular joint pains (70) ; chill at onset (62) ; nausea (45) ; sore throat (28) ; pruritus (21) ; pain on left side of abdomen (17) ; and vomiting (13). The physical signs : enlargement and tenderness of lymph glands (68) (the glands most often affected were the cervical and epitrochlear) ; morbilliform rash (46) ; bradycardia (45).

The fever curve was of the two-phase type in 51 per cent. of the cases, the first febrile spell usually lasted two days, the second occupied the fourth and fifth days. In a small percentage of cases there was a third rise to about 100°F. on the 8th or 9th day. A type of curve often seen was an initial rise to 103° or 104°F. followed by a gradual fall to normal which was reached on the 7th or 8th day. Irregular curves simulating malaria were seen in some cases.

The leucocyte count was below 4,000 in 34 per cent.; below 5,000 in 56 per cent.; and below 7,000 in 91 per cent. of the cases. The days of the disease on which the observations were made are not stated.

Many cases occurred among the hospital staff.

There seemed to be a temporary immunity.

Mental depression and insomnia, lasting three to six weeks, followed the attacks in nearly all the cases.

The severity of the attacks in each outbreak tended to be rather uniform but it varied greatly in the different outbreaks.

The author points out that many cases are missed by medical men who are not "dengue conscious."

Treatment was purely symptomatic; the patients were encouraged to drink plenty of fluids.

The usual measures of prevention were adopted. The men were instructed to make an immediate report of any feeling of indisposition so that they might be placed under control during the early infective stage of the illness. *John W. D. Megaw.*

HYMAN, A. S. **The Heart in Dengue. Some Observations made among Navy and Marine Combat Units in the South Pacific.** *War Medicine.* Chicago. 1943, Nov., v. 4, No. 5, 497–501. [10 refs.]

The condition of the heart was studied in a large number of cases of dengue in the combat area of the South Pacific during 1942–1943.

The slow pulse was found to be due to a simple sinus bradycardia, "probably the result of autonomic involvement by the virus."

Electrocardiograms showed a delay in the P.R. interval and widening of the Q.R.S. complex; other minor changes (in the T waves and R.T. segments) occasionally occurred. Various types of systolic bruits were often heard, but these disappeared during convalescence. Low blood pressure was almost invariable, this persisted for some time after the attacks.

No important changes were detected by X-ray examination.

The cardiovascular symptoms corresponded in many respects with those already described by the author as occurring after influenza, and as attributable to vagotonia. It is suggested that atropine or belladonna may have a place in the treatment both of the cardiac symptoms of dengue and of the physical depression which follows attacks and is often responsible for delayed convalescence.

John W. D. Megaw.

PLAGUE.

DE VILLAFAÑE LASTRA, T., GOOBAR, J. K. & WOLAJ, I. F. Epidemiologia de la peste en la provincia de Cordoba. [**Epidemiology of Plague in Cordoba, Argentine.**] *Primer Congr. Nac. Enfermedades Endemo-Epidémicas, Buenos Aires, 1942, Nov. 9–13.* 594–6.

The authors set out the arguments for the existence in Córdoba of sylvatic plague and its difference from the ordinary rat plague. The field rodents concerned, as has now often been pointed out, are: cuis, coneys and *Graomys*. They conclude: (1) It is not possible to regard the rat as being the sole reservoir of plague, in spite of its being the chief agent in large epidemics. (2) Plague evidently exists in latent form in the forest and agricultural regions of the north and north-east and these regions evidently constitute a huge source of infection among the sylvatic rodents. (3) The majority of the human cases of the north and north-east regions of Córdoba are due to these rodents. (4) Sylvatic plague is uncontrollable in the actual circumstances and constitutes a permanent focus of the disease capable of promoting the murine epizootic and thus menacing the urban centres.

W. F. Harvey.

MEYER, K. F., HOLDENRIED, R., BURROUGHS, A. L. & JAWETZ, E. **Sylvatic Plague Studies. IV. Inapparent, Latent Sylvatic Plague in Ground Squirrels in Central California.** *J. Infect. Dis.* 1943, Sept.–Oct., v. 73, No. 2, 144–57, 3 figs. [23 refs.]

An early problem in the epidemiology of plague was the explanation of how the disease was carried over from season to season in the rodent population. It became evident that plague persisted in enzootic areas, but the Indian Plague Commission disposed of the idea that chronic or "resolving" rat plague was concerned in the process. Much more light on the matter has come from investigations into sylvatic plague with its underground persistence and its widespread existence without much development of either rat plague or human plague. The authors discuss the significance and importance of the discovery of plague "in an area of the Calaveras Reservoir, ... California, where for the past three years a population study of the ground squirrel (*Citellus beecheyi*) has been in progress." Latent plague has to be distinguished from chronic plague. The former "represents a stage of survival of plague bacilli in the tissues" of wild rodents. Such latency has been proved, but in order that the disease may become propagated among rodents there must develop a plague bacteraemia before vector fleas can become infected. In the present research it has been shown that gross macroscopic lesions are not necessarily present in rodents affected with latent plague and that surveys depending entirely on such examinations "are not only incomplete but in fact futile." From the data "it appears not unlikely that the persistence of a latent infection in the Beechey ground squirrel is probably confined to a short period of one or two months." In this type of plague there are no inflammatory and no encapsulating lesions. There may, however, be occasional bacteraemias in the affected squirrels which provide an opportunity for fleas to become infected and thus a slumbering and latent plague enzootic is maintained in existence. In the area under survey "examination of 259 squirrels shot during July and 117 killed

in August revealed no lesions generally considered indicative of plague. The spleen, liver and lymphatic nodes from four to five squirrels were pooled, pulped, suspended in salt solution and injected subcutaneously into guineapigs. During a period of four months a total of 94 pools . . . from 440 squirrels were tested. Fifteen . . . of the pools induced fatal plague infection in guineapigs." During September and October, on the other hand, testing of organ pools furnished completely negative results. *W. F. Harvey.*

Milmore, B. K. **Harborage of *Rattus rattus alexandrinus*.** *Pub. Health Rep.* Wash. 1943, Oct. 8, v. 58, No. 41, 1507–9. [16 refs.]

"Contrary to the general belief that *R. r. alexandrinus* inhabits only upper parts of buildings, the observations presented show that this species sometimes burrows in the ground and may be encountered under buildings and in basements and sewers. Most descriptions overemphasize the differences in harboring habits of the common species of rats."

de Villafañe Lastra, T. & Rodeiro, M. "El edema regional" en la peste. (Nota previa.) [**Regional Oedema in Plague.**] *Primer Congr. Nac. Enfermedades Endemo-Epidémicas, Buenos Aires, 1942, Nov. 9–13.* 568–9.

In plague two chief varieties of oedema occur: one acute, hot, without pitting, and the other chronic, residual, deforming the locality without alteration of the skin. The latter has to be differentiated from the oedema of lymphogranuloma inguinale, and is exemplified by two cases described by the authors in which plague cultures were positive and the Frei test negative. As both diseases may exist in the same locality, the diagnosis is sometimes difficult.
W. F. Harvey.

de Villafañe Lastra, T. & Rodeiro, M. Estudio de la meningitis pestosa. [**Plague Meningitis.**] *Primer Congr. Nac. Enfermedades Endemo-Epidémicas, Buenos Aires, 1942. Nov. 9–13.* 579–85.

The authors have met with four cases of meningeal plague as a complication of the bubonic type, although one of these patients also developed a septicaemia. Symptoms were: delirium, excitement, mental confusion, headache, hallucinations, disorders of speech, neck rigidity, Kernig's sign and cerebrospinal fluid under pressure. Similar symptoms may occur in various infections such as brucellosis, typhoid and pneumonia with relative frequency and without great significance. Nevertheless it must be noted that in plague these symptoms do not have a favourable significance and usually indicate the beginning of true plague meningitis, which is fatal. In meningeal cases with clear cerebrospinal fluid, culture has been negative for *P. pestis*. The four cases of plague meningitis studied all showed purulent turbidity of the spinal fluid and afforded plague cultures. Since the authors began to study particularly the nervous system in plague cases, with a complete examination of the cerebrospinal fluid, they have discovered four cases of plague meningitis out of 39 hospital admissions for plague, and they believe that a meningeal localization of the plague bacillus would be found with greater frequency if such systematic examination were carried out more often. *W. F. Harvey.*

DE VILLAFAÑE LASTRA, T., GOOBAR, J. K., RODEIRO, M. & VIDELA, L. F. Tratamiento de la peste de Oriente. [**Treatment of Plague.**] *Primer Congr. Nac. Enfermedades Endemo-Epidémicas, Buenos Aires. 1942. Nov. 9–13.* 586–93, 9 figs.

The statistics on which pronouncement is based were :—a mortality of 70·87 per cent. during 1940, when serum was sometimes employed on a large scale, and of 23·33 per cent. for 39 patients treated with cibazol [sulphathiazole]. The latter figure of 23·33 per cent. is more correctly reduced to 14·28 per cent., when four of the patients who died within the first 24 hours of admission to hospital are excluded. All cases were true plague infections, proved bacteriologically. The failure of previous trials of sulphanilamide and sulphapyridine have convinced the authors that sulphathiazole is the treatment of choice in plague. They place no faith in the utility of serum treatment. Chemotherapy must be started early and with high doses (10 gm. in the adult) so as to maintain a high concentration in the blood (greater if possible than 8 mgm. per cent.). Such dosage [10 gm. daily] should be maintained until the condition has become normal unless there is manifest intolerance to the drug. In one case, after the administration of 10 gm. on the first and second days the patient's temperature rose and the dose was then increased to 16 gm. daily up to the seventh day, making a total dosage of 110 gm. The fever terminated by lysis, becoming normal on the 10th day. *W. F. Harvey.*

JAWETZ, E. & MEYER, K. F. **Avirulent Strains of** *Pasteurella pestis*. *J. Infect. Dis.* 1943, Sept.–Oct., v. 73, No. 2, 124–43, 1 chart & 1 pl. [35 refs.]

Controversy regarding the use of killed or live plague vaccine has now continued for a long time and opinion seems to be veering towards the use of the live vaccine. Such a vaccine must, of course, be safe and must have superiority in immunogenic power. " For the routine test of harmlessness performed with isolated plague strains, 0·2 ml. of a 10^{-4} broth culture dilution (ca. 5,000–10,000 organisms) were inoculated intraperitoneally into groups of mice . . . This particular dose was selected because it was certain not to produce any primary toxic effects . . . ", while " for the test of immunogenic power, dilutions of 300 million per ml. suspensions, ranging from 10^{-1} to 10^{-6}, were inoculated subcutaneously in 0·2 ml. amounts into mice and in 0·2 ml. or 1·0 ml. amounts into guineapigs . . . The standard challenge test dose was administered on the 14th day . . . " Three methods for obtaining avirulent strains were employed : (1) growth of virulent strains for long periods in alcohol-broth at high temperature, (2) isolation, from virulent strains kept some time in the refrigerator, of single avirulent colonies and prolonged incubation of broth cultures at 32°C., (3) passage of virulent strains through immune animals and their recovery by culture from the infected immune animals.

The definition given of an avirulent plague bacillus is that it shall not be able to cause death of the test animal " unless introduced in number sufficient to produce toxic death without multiplication." Insistence is made on the necessity for isolation of the avirulent organism, which is to be used as vaccine, as a single cell. If this is done experience has shown that there is no danger of reversion to virulence. Reference is made to the great differences found among experimental animals in

their resistance to plague toxin and to different avirulent strains. The authors incline to the idea that such differences may only be quantitative and depend on what SCHUETZE [this *Bulletin*, 1932, v. 29, 676; 1939, v. 36, 974] ascribed to the possession of greater or less amounts of "envelope." At all events it seems probable that antigenic constituents of importance in immunization may differ in their resistance to heat and that a strain possessing one type of antigen may be immunogenic for one species of animal and another type for another species: the possession of "an appreciable amount of envelope" might account for the guineapig and rat antigens respectively, which have been postulated by OTTEN [this *Bulletin*, 1937, v. 34, 416; 1942, v. 39, 309].

"It is concluded that properly tested live plague vaccines are safe and superior in immunogenic activity for experimental animals to any killed preparation used at the present time." *W. F. Harvey.*

CHOLERA.

SEN GUPTA, S. K. **Prevalent Types of Cholera Vibrio.** [Correspondence.] *Indian Med. Gaz.* 1943, Sept., v. 78, No. 9, 464.

At the Bower Disease Research Department, School of Tropical Medicine, Calcutta, the following isolations from cases of cholera (diagnosed clinically) were made in the years named :—

Year	Cases studied	*V. cholerae* isolated		No vibrios recovered
		Inaba	Ogawa	
1941	250[?205]	71	76	58
1942	226	45	70	111
1943	266	*nil**	154	112

* Later 1 strain was isolated.

The Inaba subtype has been declining since 1941, and this fact is important in the preparation of vaccine, which, for use in the Calcutta area, should consist principally of the Ogawa subtype. It is emphasized that in future great care should be taken to type the vibrios during epidemics, and to supply the appropriate vaccine.

Charles Wilcocks.

GALLUT, Jean & GRABAR, P. Recherches immunochimiques sur le vibrion cholérique. I. Etude quantitative de la réaction de précipitation de l'antigène glucidolipidique par l'immunsérum de lapin. [**Quantitative Precipitation of Cholera glucolipidic Antigen by Immune Serum.**] *Ann. Inst. Pasteur.* 1943, July–Aug., v. 69, Nos. 7–8, 250–53.

In a recent publication GALLUT [this *Bulletin*, 1943, v. 40, 910] set out the evidence that the cholera vibrio contains a glucolipidic complex which is the somatic O antigen of this organism, and that the toxin itself contains both glucolipidic and protein active elements. In

the present study variable quantities of the glucolipidic antigen were added to a fixed amount of rabbit antiserum and the quantity of antibody precipitated determined by estimation of nitrogen. From the data obtained (1) the ratio mgm. of N of the antibody/mgm. of glucolipid, and (2) the combining molecular weights of glucolipid antigen and antibody, were evaluated. The methods thus developed showed that notable differences were apparent in the immunological behaviour of vibrios belonging even to the same serological group, and that these might be utilized for the classification of cholera vibrios in general.

W. F. Harvey.

GALLUT, Jean & GRABAR, P. Recherches immunochimiques sur le vibrion cholérique. II. Sur les constituants de la toxine cholérique. [**The Constitution of the Cholera Toxin.**] *Ann. Inst. Pasteur.* 1943, Sept.–Oct., v. 69, Nos. 9–10, 307–9, 2 figs.

Two questions arise for answer: (1) Is the toxin made up of several antigens? (2) Does the glucolipidic complex of the toxin differ from the glucolipidic extract of the vibrio?

(1) Since an antitoxic serum, exhaused by saturation with glucolipid, is no longer precipitated by the toxin, it would appear that the toxin possesses no other antigen than the glucolipid.

(2) By comparison of the curves of precipitation obtained with an antiglucolipidic serum tested with (1) the bacterial glucolipid (A), (2) the toxin (C), and (3) the glucolipid of the toxin (B) respectively, it is found that the two latter are higher than the first. As the antiglucolipidic serum can only contain antibody to its own injected antigen, the deduction is admissible that the differences found are due to an antigenic composition different from the glucolipid of the toxin. The author draws the conclusion from his experiments that when first elaborated the toxin contains a complex glucolipid antigen, which subsequently is split into a simpler glucolipid (such as that of the extract of the vibrios) and a substance which is not precipitated by the immune serum. [See also this *Bulletin*, 1943, v. 40, 910.] *W. F. Harvey.*

YAWS.

KINELL, J. **Yaws. Report of a Case appearing in a White Man.** *U.S. Nav. Med. Bull.* 1944, Jan., v. 42, No. 1, 187–92, 2 figs.

[Yaws, probably the commonest of diseases among native children in the tropics, is rarely seen in white races or outside the tropics and sub-tropics, unless we regard the button-scurvy of Ireland, the sibbens of Scotland, and radesyge of Scandinavia as yaws, a question which has never yet been decided, or unless we look upon yaws and syphilis as fundamentally the same. To find a case of yaws in a white man, a United States soldier, in an island of the South Pacific, where syphilis is said to be absent, is consequently worthy of record.

The rarity of yaws in Europeans in the tropics is ascribed partly to the wearing of more clothes, partly to the higher standards of hygiene in general, and partly to the absence of close contact with the native. These facts, however, would not exclude insect transmission, as by *Hippelates pallipes*, which is thought to be probable (see this *Bulletin*, 1937, v. 34, 961, 963; 1936, v. 33, 961).]

The patient whose case is recorded here was a staff-sergeant, 20 years of age, who had been in the district for fifteen months. He often paid visits to native friends and fondled their children, and, being an aviation mechanic he was liable to cuts, abrasions and scratches on his hands and forearms. His primary lesion, "mother yaw," was on the flexor surface of the right wrist. It appears to have been quite typical [but no mention is made of any preliminary fever or malaise, which would probably be present in an adult]. Three months later (*i.e.* after rather longer than the usual interval), secondaries, also typical, began to appear elsewhere on the body—root of the penis, gluteal furrow, finger, palm, popliteal space, cheek, chin—together with gland enlargement. Treatment was arranged for a complete course of ten intravenous injections of neoarsphenamine and the same number of bismuth salicylate injections intramuscularly, at first at 4-day intervals, later at weekly intervals. As usual in yaws, healing was in progress after two injections, and 21 days after starting treatment the patient was transferred, with all his lesions healed. He showed some degree of sensitivity to neoarsphenamine, evidenced by a generalized dusky red, maculo-papular rash, and when he left mapharsen was about to be substituted. He strenuously denied having run any risk of contracting venereal disease; moreover syphilis was not seen in the area, as already stated. *H. Harold Scott.*

LEPROSY.

Barros de Sá, M. Estudo analitico da reacção de sedimentação do sangue (em 100 leprosos da Leprosaria de Macasana). [**Study of Blood-Corpuscle Sedimentation in One Hundred Lepers at the Macasana Leprosarium.**] *Arquivos da Escola Méd.-Cirurg. de Nova Goa.* Ser. A. 1941, No. 15, 179–220. [40 refs.]

Just twenty years ago Puxeddu recorded the rapidity of sedimentation of red cells in leprosy, particularly in the active stages of the disease [see this *Bulletin*, 1924, v. 21, 874]. He stated that the time varied between 60 and 90 minutes, whereas in normal persons it was 7 hours or more. Varying records have been made since that time and the author has done a useful piece of work in making a study of 50 male and 50 female lepers, in varying stages of nervous, nodular, and mixed forms of the disease. He found that the variations between one leper and another were so great that the test was of no real value in diagnosis or prognosis generally, but that *for each individual patient* it might have considerable value, in enabling one to judge of progress and of the results of treatment. This means that there is no *general* rate or formula which will serve as a standard, but that each patient should have a "curve of sedimentation" plotted by frequently repeated tests and useful information could be gathered from such a chart. [See also this *Bulletin*, 1926, v. 23, 515; 1927, v. 24, 215; 1928, v. 25, 209, 978, 979; 1929, v. 26, 341, 1039; 1930, v. 27, 338; 1931, v. 28, 960, 961; 1933, v. 30, 559; 1934, v. 31, 551.] *H. Harold Scott.*

Basombrio, G., Mom, A. M., Noussitou, F. & Leon, R. C. Estudios sobre reactibilidad cutanea experimental en lepra. (Comunicación preliminar.) [**On Skin Reactions in Leprosy.**] *Rev. Argentina de Dermatosifilologia.* 1943, Sept., v. 27, No. 3, 406–11, 1 chart. English summary.

These findings, if confirmed, will have a considerable bearing on the value and interpretation of the lepromin reaction. The authors have tested the effects of epidermal contact and intradermal injection of 2-4 dinitrochlorobenzene in acetone, in cases of tuberculoid leprosy and of leproma and in non-leprous subjects; for contact they used dilutions of 1/1000, 1/100, 1/50 and 1/20, while for the intradermal test the 1/1000 solution was diluted to 1/2000 with physiological saline and 0·2 cc. injected. The results were compared with those obtained with whole lepromin prepared by Hayashi's method. A chart shows the reactivity of the skin, as erythema or vesication. In the lepromatous patients the reaction is more marked, is apparent earlier and evolves more rapidly than in cases of tuberculoid leprosy and non-leprous controls, but the characters differ little from those in the skin of a subject on a diet in which alkalis and chlorides are a prominent feature. In intensity and time of evolution the effects were the same as those with lepromin. It is inferred, therefore, that the so-called specific lepromin reaction can be simulated by a non-protein, non-specific irritant or excitant, dinitrochlorobenzene. [This is a preliminary communication; further work will be awaited with interest].

H. Harold Scott.

Gonzalez Guzman, I. Estudio de los granulocitos sanguíneos de los leprosos. [**Study of the Granulocytes in Leprosy.**] *Arch. Latino Americanos de Cardiol. y Hematol.* 1943, May–Aug., v. 13, Nos. 3 & 4, 119–38, 1 fig. [15 refs.]

[This article is a useful set-off to those which record all sorts of blood changes in leprosy. Unfortunately, the number of cases studied here is very small and it would seem that rather a lot is claimed from few data.] The author has studied the numbers of leucocytes—polymorphonuclears, eosinophiles and basophiles—and their characters in 33 lepers, nine with the diffuse cutaneous form, seven nodular, six tuberculoid, five of the nervous and five of the Lucio form [see this *Bulletin*, 1943, v. 40, 922], and one mixed. Totals and percentages are given for each. The polymorphonuclear range was between 62·6 per cent. in the mixed case and 44·5 in the nervous cases, the nodular being 56·8 per cent. and the totals well within the normal limits, except for one patient with the nodular form who had 12,276 per cmm., but another in the same group had only 1,870. A tendency towards leucopenia was thus more common, leucocytosis rare. The Arneth Index showed a deviation to the left. Eosinophiles also were within the normal limits, except in the tuberculoid form where the average was 6·2 per cent., the nervous had 3·8 and the other 1–2 per cent. But, says the author, "unfortunately I was not able to find out whether any intestinal parasites or any other condition likely to cause eosinophilia was present in the six patients with this type of leprosy." [This would seem to deprive the observation of any value.] The basophile percentage also did not exceed normal limits, though it was highest, 0·9, in the diffuse cutaneous and the tuberculoid forms.

H. Harold Scott.

Bosq, P. Eliminación de los bacilos de Hansen a traves de la epidermis de los enfermos de lepra. [**Discharge of Bacilli by the Skin in Lepers.**] *Rev. Argentina de Dermatosifilologia.* 1943, Sept., v. 27, No. 3, 423–5, 3 figs.

The presence of Hansen's bacilli in the deeper parts of the skin is well known, but examination of the superficial layers is usually barren of results. Foote in 1941 found none positive among 63 examined and Aberastury found only one among 163, but in that case they were present in large numbers in macrophages and in isolated groups. The present author, however, has recorded finding them at times in large numbers in macrophages and sparsely with the epidermal scales. He scrapes gently the upper layers of squamous epithelium without injuring the healthy epidermis and mixes the powdery product with a drop of Meyer's albumin on a slide. Before staining, he waits for 24 hours because he finds that immediate staining results in incomplete decolorization of the smear and some of the horny scales retain the red of the carbol fuchsin. He is of opinion that the " stage of epidermic elimination " is transient, but the cause of the intermittency calls for further investigation. On the other hand it may be constant for certain patients, and if that is the case there is need for more investigation as to why one should eliminate the bacilli and others do not. *H. Harold Scott.*

Soto, M. C. Consideraciones clinicas sobre las complicaciones oculares de la lepra. [**The Eye-Complications of Leprosy.**] *Rev. Argentina de Dermatosifilologia.* 1943, Sept., v. 27, No. 3, 412–22, 4 figs. [37 refs.]

The author's remarks are based on a study of 300 cases in the Rosario Hospital. He enumerates, and comments on, the various ocular lesions seen in leprosy, as they affect the eyelids and adjacent regions, nasal, malar, temporal and frontal, and the conjunctiva, the lachrymal glands and ducts, the cornea, sclerotic and iris. Many (perhaps all) are merely local manifestations of the general disease, often occurring as complications some years after the cutaneous manifestations appear, but sometimes assuming an acute form accompanying or as part of the leprous reaction. The author has not observed lesions of the palpebral conjunctiva attributable to leprosy, but a scraping taken at the reflexion of this membrane at the palpebral border may reveal the lepra bacillus. He states that the leprous reaction is a complication which varies according to the clinical form of the disease. In tuberculoid cases the effect falls on the integuments (lids) and not on the globe, but in lepromatous patients the results may be very serious as regards vision ; iritis or irido-cyclitis may cause blindness. Again, the eye lesions may arise and progress quite independently of any general reaction.

Two theories have been advanced to account for the involvement of the globe in leprosy. The *exogenous*, according to which the lesions of the lids, the mucosa and the adjacent eye-structures arise by continuity and spread from the more superficial to the deeper tissues, conjunctiva, sclerotic and cornea, and then to the iris and ciliary body. The *endogenous*, or vascular spread, based on the facts that often they arise in the febrile period of a leprous reaction when there is a bacteriaemia, and that the lesions are usually bilateral. There is a third theory that the bacilli pass *via* the nerves ; but none of these theories is very convincing. *H. Harold Scott.*

Soto, M. C. Algunas consideraciones sobre el tratamiento de las complicaciones oculares de la lepra. [**Remarks on the Treatment of the Ocular Complications of Leprosy.**] *Rev. Argentina de Dermatosifilologia.* 1943, Sept., v. 27, No. 3, 429–33. [11 refs.]

The treatment of the eye complications of leprosy is divided by the author into: (1) Medical; (2) Fundamental or aetiological; (3) Subsidiary or adjuvant; (4) Surgical. By the second he means treatment of the leprosy itself by chaulmoogra. The proportion of properly treated patients who develop eye complications is to be the subject of another article. The third includes protein, shock, pyretotherapy, vitamins, etc.

He mentions treatment of the lids by carbonic acid snow, trichloracetic acid and emolients; of iritis, irido-cyclitis and keratitis by atropine, dionine, yellow oxide of mercury and iontophoresis, in particular ionization with a soluble derivative of chaulmoogra. Surgical treatment entails dealing with retracting scars, ectropion, lagophthalmos, extirpation of lepromata of the lids and localized episcleral formations. [The paper is a slight one and in the main, that is except for the treatment of the basic disease, leprosy, the treatment of ocular complications differs in no way from that of the same complications of non-leprous origin.] *H. Harold Scott.*

Fiol, H. & Zambrano, J. La vitamina B_1 en el tratamiento de las complicaciones oculares de la lepra. [**Vitamin B_1 in the Treatment of Ocular Complications of Leprosy.**] *Rev. Argentina de Dermatosifilologia.* 1943, Sept., v. 27, No. 3, 439–42. [14 refs.]

Others have reported benefit from the use of vitamin B_1 in patients with trigeminal neuralgia, in keratitis, and corneal ulceration associated with avitaminoses, so the authors have tried the same treatment in the eye complications of leprosy; with irido-cyclitis (5 cases), with nodular keratitis (2), with these two conditions combined (2), and nodular iritis and conjunctivitis with episcleritis (1 each). They have used hydrochloride of aneurin or thiamin in doses of 25–50 mgm. daily, or on alternate days in some cases, injected intramuscularly or (better) intravenously, for a course of 5–10 injections. Relapse occurs some months after the treatment is stopped but this clears up on renewal of the treatment. Smaller doses given continuously act prophylactically [then why cease treatment and allow relapses to occur?] The authors do not claim that the vitamin treatment is curative, but that it diminishes the intensity and duration of the lesions and so delays the onset of loss of vision. *H. Harold Scott.*

Fiol, H. & Calcagno, O. Ensayo e tratamiento de la lepra con un derivado coloidal y timolado del acido chaulmoogrico: el timolhidrochaulmoogricosol. [**Treatment of Leprosy with "Thymolhydrochaulmoogricosol," a Colloid Derivative of Chaulmoogra.**] *Rev. Argentina de Dermatosifilologia.* 1943, Sept., v. 27, No. 3, 426–8.

This preparation is a combination of thymol with the active principles of chaulmoogra and is obtained by treating a colloidal solution of the acid with thymol, the final product containing 0·012 gm. thymol

and 0·002–0·006 gm. of chaulmoogric acid in 2 cc. It may be administered intravenously in doses of 2–6 cc., intramuscularly 6 cc., or intradermally in doses up to 10 cc., each thrice weekly. So far 28 patients with the lepromatous form have been treated; of these 10 have improved, 18 have remained unaffected, none was made worse. Of six with tuberculoid leprosy, five have improved, the other remaining stationary. Two of the mixed form have been thus treated, but so far without change. Some patients had had to cease treatment by the chaulmoogra oil and the ethylic esters owing to ocular complications or leprous reactions, but they tolerated the new preparation well. As the authors acknowledge, they have used it for four months only, far too short a time to judge of permanent results. *H. Harold Scott.*

Fiol, H. Consideraciones sobre el tratamiento de la lepra y resultados obtenidos despues de un año de observación en el Sanatorio-Colonia "Buenos Aires." [**Results of the Treatment of Leprosy during the Year at the Leper Colony "Buenos Aires."**] *Rev. Argentina de Dermatosifilologia.* 1943, Sept., v. 27, No. 3, 434–8.

This is a report on the results obtained during the year [presumably 1942] since the colony was opened [dates are not given anywhere]. These results are stated in general terms, no figures or details being given beyond the fact that of a total of 369 patients five have been "released conditionally," 205 have improved, 93 have remained stationary, 29 are worse, and 37 have died.

Chaulmoogra oil has been the drug used; the Heiser-Mercado mixture containing chaulmoogra oil 7, olive oil 3, resorcin 0·3, creosote 0·4, camphor 0·15, modified to contain chaulmoogra oil 7, cod liver oil with 5 per cent. camphor 3 cc., benzyl cinnamate 0·05 gm., cholesterin 0·1 gm., resorcin 0·3 gm. The ethylic esters were used with 0·5 per cent. iodine and 4 per cent. creosote in intradermic and hypodermic infiltrations up to 10 or 15 cc. at a session. Not all patients can tolerate the high doses, but when they can the results are very satisfactory; intolerance is shown by local pain, lepra reaction, acute eye complications, erysipelatoid with fever, and these necessitate intermission in treatment. The use of the oil or of the thymol chaulmoogric acid [see above] administered intra- or hypodermically up to 10 cc. by multiple puncture has given very encouraging results.

As adjuvants, calcium gluconate, shock treatment by protein, and autohaemotherapy or milk injection have been given. Diphtheria antitoxin in doses of 1–3 cc. every 10–12 days for periods up to a year has been tried in 10 cases without benefit. Leprous reactions are treated by 1 per cent. tartar emetic, 2 cc. daily, or by adrenaline 1 per cent. [so stated], calcium, cholesterin, alkalis, and a diet of milk, fruit and vegetables. In ocular complications vitamin B_1 intensively by the intramuscular or intravenous route has given encouraging results. The same has been used for painful neuritis. For ulcers of the leg, cleanliness, congestion by elastic bandage, the use of infra-red rays, infiltration with 1 per cent. novocaine, blockage of the sympathetic terminal fibres to maintain capillary dilatation are all mentioned, but, says the author, "the secret of cure of ulcers in many cases is avoidance of excessive manipulation rather than therapeutic applications." Local cautery by carbonic acid snow, by trichloracetic acid or galvanotherapy has given benefit in certain cases and it seems also to affect lesions distant from the site treated. Paldrock [this *Bulletin*, 1942,

v. 39, 462] believes this is due to vaccination from the bacilli destroyed. Co-existent disease such as syphilis, tuberculosis, malaria, and cardiac, hepatic or renal conditions must receive attention and appropriate treatment. *H. Harold Scott.*

HELMINTHIASIS.

BURROWS, R. **Studies on the Intestinal Parasites of Mental Patients.** *Amer. J. Hyg.* 1943, Nov., v. 38, No. 3, 293–305, 5 figs. [21 refs.]

The author examined 3,000 stools from 2,055 patients in the South Carolina State Mental Hospital and anal swabs from 1,383 patients. A saline purge was given before the stool was collected and every stool was examined on the day on which it was passed. Methods included the simple smear, iodine-stained smears, preparations stained with iron-haematoxylin when the diagnosis of amoebic infections was doubtful, anal swabs (Hall's cellophane swab) for Enterobius, floatations of soil samples from the exercise yards, and examinations of samples taken from walls, door knobs, toilet seats, furniture, etc., by means of strips of cellulose tape, 5 cm. long, repeatedly pressed over the areas examined and then examined under the microscope.

There were 637 newly admitted patients, of whom 376 were white people and 261 coloured; they came from homes of all grades from wealth to poverty, from rural and urban districts, from coastal areas, mountains and sandy plateaux.

The following are the species of parasites found and the total percentage rates found in this group of male and female patients: *Entamoeba histolytica* (1·7), *E. coli* (16·3), *E. nana* (12·4), *Iodamoeba williamsi* (0·3), *Chilomastix mesnili* (3·3), *Trichomonas hominis* (3·3), *Giardia intestinalis* (1·9), *Ascaris lumbricoides* (1·4), *Necator americanus* (4·5), *Strongyloides stercoralis* (0·8), *Enterobius vermicularis* (0·5), *Trichuris trichiura* (0·8) and *Hymenolepis nana* (0·3).

The proportion of infected persons was much higher among 1,418 patients not newly admitted. These included most of the 142 patients previously surveyed by YOUNG & HAM (this *Bulletin*, 1941, v. 38, 375), who found that 90 per cent. of these 142 were infested and that some harboured seven or eight species of parasite. Burrows found that both the number of species per patient and the intensity of the worm infestation increased with the length of residence in the institution. This increase during residence was shown by egg counts done on 117 women who had been in hospital either one or over five years. Of these, 87 per cent. had very heavy Trichuris infestations of over 12,000 eggs per gm. (the highest was 181,000), 5 per cent. had over 100,000, and 37 per cent. had over 50,000.

For comparisons of the infestations of males and females and of white and coloured patients the paper itself must be consulted.

The relation of defective personal habits of the patients to the rates of infestation was studied; these habits no doubt increased the incidence and degree of infestation. Attendants dealing with the "more deteriorated" patients showed higher infestations than those who dealt with other patients. A steam hood for the sterilization of small areas of soil in the exercise yards is described and figured. *G. Lapage.*

BARNETT, L. **Hydatid Disease in New Zealand. A Brief Note on Incidence and Prevention during the Year 1942.** *New Zealand Med. J.* 1943, Dec., v. 42, No. 232, 260–61.

WESLEY, C. **Embolus of Left Femoral Artery due to a Hydatid Cyst.** *Med. J. Australia.* 1943, Dec. 11, v. 2, No. 24, 483.

THIAGARAJAH, P. R. **The Aetiology of the Anaemia of Ankylostomiasis in association with Malnutrition during Pregnancy.** Reprinted from *Trans. Soc. Med. Officers of Health of Ceylon.* 1942, Dec., v. 11, 14 pp. [37 refs.]

In Ceylon the high death-rates of mothers and children associated with pregnancy and childbirth, as well as abortions, premature births and associated ilinesses, are largely due to anaemia caused by hookworm and malarial infections, chiefly the former [see WICKRAMASURIYA, *Bulletin of Hygiene*, 1939, v. 14, 665]. In 1939 haemoglobin estimations were made in 1,119 women admitted to the De Soysa Lying-in Home ; only 150 women had over 50 per cent. The anaemia of these women is of the nutritional deficiency type with hypochromia and microcytosis ; in the author's opinion it is due partly to a deficiency of iron in the diet and partly to defective absorption of iron owing to damage to the intestinal mucosa by the worms. [Other workers (*e.g.* NAPIER *et al.*, this *Bulletin*, 1942, v. 39, 100 ; HILL & ANDREWS, *ibid.*, 1943, v. 40, 324 ; HEILIG, *ibid.*, 68) think that direct loss of blood with a deficient supply of iron in the food is the main cause of the anaemia of hookworm infection.] The author emphasizes the need for iron therapy as a "follow up" after disinfestation by anthelmintics. [In severe anaemia, *e.g.* haemoglobin below 40 per cent., some workers insist that iron should be given to increase the haemoglobin before anthelmintics are used and, of course, continued afterwards.] *J. F. Corson.*

MAKHLINA, R. M. [**An Experiment on the Sanitation of a Focus of Ankylostomiasis.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1942, v. 11, No. 5, 72–6. [In Russian.]

The author reports on a village near Batum where the people are engaged in agriculture, the sanitary practices are poor, and hookworm and Ascaris infestation is considerable. Treatment with santonin and carbon tetrachloride was given [doses not stated] and between the spring and autumn of 1939 the hookworm infestation rate was reduced from 48·4 to 6·3 per cent. [Fülleborn's method] ; nevertheless, 21·4 per cent. of those treated remained infested. Intensity of infestation was reduced from 4,700 to 410 eggs per gm. of faeces [Stoll method]. There was an average increase of 6·2 per cent. in the haemoglobin of treated persons.

The author concludes that systematic treatment does not give constant results without improvement of sanitation. *G. Lapage.*

BEATTIE, J., HERBERT, P. H., WECHTEL, C. & STEELE, C. W. **Studies on Hepatic Dysfunction. I. Carbon Tetrachloride Poisoning treated with Casein Digest and Methionine.** *Brit. Med. J.* 1944, Feb. 12, 209–11. [12 refs.] [Summary appears also in *Bulletin of Hygiene.*]

A case of acute carbon tetrachloride poisoning, following accidental ingestion of 30–40 cc., was successfully treated with methionine. The

patient, a U.S. Army Air Force sergeant-pilot, aged 23, swallowed the carbon tetrachloride at 4.15 p.m. on Oct. 2, 1942, on an empty stomach, having had no food since 7.15 a.m. He quickly became "dizzy and light-headed" but could walk with assistance. At 4.35 p.m. he was given salt and water and this caused vomiting at 5 p.m. He was put to bed and was given 1½ grains of luminal; he refused food that evening and next morning. He was examined at 11 a.m. on Oct. 3rd by one of the authors who found the liver tender and enlarged to 2 in. below the costal margin. At 12·30 p.m. the patient was given by mouth and retained 2 gm. of *dl*-methionine; at 3.30 p.m. 1 cc. of a casein-digest-methionine solution was slowly injected intravenously and caused no immediate reaction; five minutes later 5 cc. was injected also without reaction.

"The infusion was prepared by dissolving 20 g. of a dried papain-trypsin digest of casein in 600 ml. of distilled water. The solution was acidified, and to it was added 15 g. of *dl*-methionine. It was then boiled and filtered. The final *p*H was 7·6 and the solution was approximately isotonic. It was tested by injecting 20 ml. into the ear vein of a rabbit. No effect was observed within a period of two hours."

Continuous intravenous infusion of the solution by a drip apparatus was begun immediately, the rate being about 2 cc. a minute. At 6 p.m. the edge of the liver was 2½–3 in. below the costal margin. At 6·30 p.m., when 436 cc. had been infused, he complained of chilliness, intense headache and backache; his pulse was thin, his lips slightly cyanotic and his blood pressure was 130/20; infusion was stopped, hot-water bottles and blankets applied and 5 grains of an aspirin-codeine mixture given. An hour later he was much better and his blood pressure was 120/88. At 7 p.m. he ate and retained a small meal.

Next morning, Oct. 4, he was mentally alert and took food well; the edge of the liver was only ½ in. below the costal margin. On the following morning, however, the dizziness and headache returned and his liver was 1 in. below the costal margin; methionine was given by mouth 2 gm. at 9 a.m. and 2 gm. at 7 p.m. He took food well and felt better and by next day, Oct. 6th, he was apparently well but was kept under observation for another week; soon afterwards he had resumed normal operational flights over enemy-occupied country.

Icterus was absent throughout the illness. The total amount of methionine given intravenously was 9·5 gm.

Rationale of methionine treatment was based on the observation of Miller and Whipple in 1942 (*J. Exper. Med.*, 1942, v. 76, 421) that damage to the liver of animals from chloroform anaesthesia could be avoided if 3 gm. of methionine were injected within 3–4 hours.

Laboratory investigations, indicating the mode of action of methionine, included estimations of the nitrogen and sulphur balances and partition of the urinary sulphur between oxidized (total sulphate) and unoxidized (neutral) fractions.

The nitrogen balance showed a retention of 6 gm. over the whole period, but a negative balance of 7 gm. on the second and third day, suggesting that on these days the processes of protein synthesis in the liver were impaired. There was a significant retention of sulphur, and an excessive excretion of the unoxidized fraction during the first two days and during the relapse—65 per cent. of the amount given as methionine—whereas in the normal individual 95 per cent. is excreted as the oxidized fraction within 24 hours. The only other significant

abnormality was a rise in serum bilirubin when the liver was enlarging rapidly and the transient appearance of urobilinogen during the relapse.

It is concluded, therefore, that no actual destruction of liver tissue took place but that the cause of liver disturbance induced by carbon tetrachloride is the abnormal metabolism of methionine and related compounds. The administration of methionine is considered to have prevented permanent liver damage. *Ethel Browning.*

LEVIN, I. L. [**The Problem of Strongyloidosis.**] *Klinicheskaya Meditsina.* Moscow. 1942, v. 20, No. 5–6, 70–74. [In Russian.]

This paper gives a general account of strongyloidosis, due to infestation with *Strongyloides stercoralis* and an account of 12 cases seen by the author (*cf.* SHIKHABOLOVA & SEMENOVA, below). Some details of three cases are given.

The author points out that strongyloidosis is not a disease of tropical climates only; he regards it as a definite disease, characterized by gastro-intestinal symptoms and general intoxication.

The clinical picture is extraordinarily varied. Some cases show few or no signs of illness; others are severe and fatal. The onset may be acute, simulating entero-colitis, or gradual, with debility, headache, and gastro-intestinal troubles persisting for several years with alternating improvement and deterioration. Among gastro-intestinal symptoms are vomiting, heart-burn, nausea, meteorism, salivation, giddiness, diarrhoea or alternating diarrhoea and constipation; and jaundice in some cases. Some patients may undergo operation for appendicitis, gastric ulcer, etc.; this had happened in three of the author's cases. Meteorism was the most frequent complaint. He noted also a rise in the temperature, sometimes to high levels. A temperature of 38–39°C. [100·4°–102·2°F.] may be maintained for several days, or there may be periods of subnormal temperature with intervals of higher temperature. No other cause for the high temperature could be found. The patient may have a characteristic muddy tint of the skin of the face. A rash may occur on the skin and may be localized over the abdomen. The blood may show signs of anaemia and eosinophilia of varying degrees. Treatment was not satisfactory. Carbon tetrachloride, male fern and thymol were tried; thymol was the best of these. After it patients reported improvement, but it did not remove the larvae completely from the faeces, although it reduced their number. Reference is made to treatment with gentian violet, which apparently the author did not use (*cf.* SHIKHOBALOVA & SEMENOVA, below). *G. Lapage.*

SHIKHOBALOVA, N. P. & SEMENOVA, N. E. [**On the Problem of the Clinical Study and Treatment of Strongyloidosis.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1942, v. 11, No. 5, 76–83. [In Russian.]

After a brief history of the discovery that some cases of helminthiasis in man are due to *Strongyloides stercoralis*, the authors note that the first cases in Russia were discovered in 1896 by SPASOKUKOTSKY. In 1922, SKRIABIN and WAGNER collected four cases and themselves described five others. By 1924, Russian cases had been noted in Erivan, Azerbaijan, the Don Basin and Middle Asia, and by 1937

others had been found in more northerly regions, including Moscow and its surroundings, where some of the patients had not left that district.

In this paper the authors give the results of their study of 29 cases from Moscow and the Moscow district between 1939 and 1941 ; 28 were adults (9 men and 19 women) and 1 was a girl aged 12 ; 21 were inhabitants of Moscow and district (7 had never left that region). Of the other seven, 2 were from Kursk, 2 from Middle Asia, 2 from Yaroslavl (1 of these had come from Vladivostock and 1 from Kirovabad) and 1 from Dalnevostock.

Experiments showed that the climate of Moscow is favourable to the appearance of small foci of strongyloidosis.

A table shows the subjective symptoms and indicates that the most frequent of these were stomach pains, nausea, salivation, diarrhoea or constipation ; other symptoms were headache, dizziness and increased irritability. Patients were at the clinic 16–20 days and their faeces, blood and duodenal contents were examined.

The gastric juice of 10 patients was examined before treatment. The acidity was below normal in all except one, in whom there was a total acidity of 45 and the free HCl was 15. A table gives the results. The gastric juice was not examined after treatment.

The blood examination showed eosinophilia in most of the patients ; in some it was high. Table 2 shows that immediately after treatment the eosinophilia decreased considerably (*e.g.* from 25 to 0·5 per cent., from 25 to 7 per cent., from 14·5 to 3·5 per cent.) ; but in some cases which reached 66·5 per cent., this decrease did not occur (a few months after treatment it was still at 40·5 per cent.). The haemoglobin values were about normal before and after treatment and the number of leucocytes was normal in most cases. In 10 patients examined during some months after treatment there was a steady decrease of the eosinophilia after treatment, but in three this did not occur and there was even an increase.

Examination of the faeces for larvae was done on all patients. Füllleborn's method was used and the authors also commend the Baermann method, referring to Gefter's (*Med. Parasit. & Parasitic Dis.*, 1942, No. 1/2, p. 60) work, which showed that the Baermann method was better than microscopical examination of the duodenal contents. The authors think that duodenal contents should be obtained only from subjects who are still suspected of the disease after repeated negative examinations of the faeces. The cases were treated with gentian violet and crystal violet given in capsules in doses of 0·5 [they do not say whether they gave grammes or grains, presumably grains] for 8–16 days without interruption, the duration of the course depending on the intensity of the infection, the reactions of the patients and the effect on the parasites. In 11 men there was nausea and 5 vomited. The remainder tolerated the drug. No difference was noted between the tolerance and efficacy of gentian violet and crystal violet. Some patients had, in addition to doses by the mouth, instillation of the drug into the duodenum. Fifteen of the patients were observed for not more than two months, and 14 for 3 to 16 months after treatment. Table 4 shows the numbers of positive cases found during these periods of observation. The authors think that the results give a rather false impression of the efficacy of the drug, because, in some cases, larvae disappeared during treatment but reappeared in small numbers 1–2 months after treatment had ceased. They think that patients should

be observed for a longer time after treatment. Even 2–4 days after treatment began the number of larvae decreased considerably in some cases (*e.g.* Case No. 5 had 141 larvae before treatment; after two days' treatment the number was 49, after four days 21, after five days 10, after six days 2 and after seven days 0; but after 16–17 days there were 1–3 larvae and they disappeared and reappeared during the next eight months). The symptoms showed striking improvement after treatment. The authors think that a serious study of strongyloidosis should be undertaken; it has been found among soldiers at the front where sanitary conditions may favour its occurrence. Soviet manufacturers are urged to produce "enteric-coated" capsules of gentian violet. *G. Lapage.*

Fernando, P. B. & Balasingham, S. **Acute Ascariasis in Children.** *Indian J. Pediatrics.* 1943, Oct., v. 10, No. 40, 149–73. [32 refs.]

Pointing out that, in countries where ascariasis is present, infestation of children is frequent, the authors say that ascariasis of children is not adequately described in text-books. They have found in this *Bulletin* a wealth of records of experimental and laboratory work on Ascaris and many references to isolated cases of ascariasis in children, but very few articles dealing with the subject as a whole. The present paper is intended to do this. It is based on 162 cases admitted to the Lady Ridgeway Hospital for Children at Colombo during 1938–9.

Ascariasis and ankylostomiasis are the two most important helminthiases in Ceylon. The Health Department conducts a campaign against them and, in 1938, 31,713 samples of faeces were examined microscopically. Of these 70 per cent. had hookworms, 65·6 per cent. had roundworms [presumably Ascaris], 58·8 per cent. whipworms [Trichuris], while only 1·7 per cent. had threadworms [Enterobius], and 0·03 per cent. tapeworms. [It is a pity that at least the correct generic names are not given in this and some other papers on the incidence of helminths.]

The authors conclude that two-thirds of the general population *of all ages* harbour *Ascaris lumbricoides*, especially in rural districts. About 10 per cent. of patients attending out-patient departments and dispensaries suffer from the effects of ascariasis and about 0·5 per cent. of these latter need hospital treatment. Among in-patients the case mortality of *acute* ascariasis is 8 per cent., which is more than twice that of ankylostomiasis (3·3 per cent.).

Analysis of the records of 3,564 children admitted to the Lady Ridgeway Hospital at Colombo, Ceylon, during 1938–9 indicates that 162 (4·6 per cent.) of these were admitted for acute ascariasis, this disease being sixth in frequency in the list of diseases recorded, and third among the causes of death (it caused 4·7 per cent. of all the deaths, being third only to pneumonia and acute diarrhoea with vomiting). Usually the younger the child the more severe the disease is. Most of the children admitted for acute symptoms were under five, and the death rate among these was more than twice that among older children.

About two-thirds of the patients in the authors' wards, whose faeces were examined microscopically, had "evidence of ascaris infection," but only a small percentage of these had symptoms of ascariasis. This indicates that some factor converts the infestation into a severe condition in some cases. The authors suggest that this factor is the

toxic effect of products liberated when the nematodes die in the intestine, and they quote much experimental work [abstracted in this *Bulletin*] which indicates that the injection of Ascaris material can cause the symptoms of acute and chronic ascariasis.

The symptoms are very varied. Chronic ascariasis is described and its treatment with santonin or oil of chenopodium discussed.

The greater part of the paper deals with acute ascariasis. The authors very strongly deprecate the use of an anthelmintic during the acute stage, when treatment should be symptomatic. Most (over 90 per cent.) of the 162 patients seen were well-nourished ; many of the older children had a history of chronic ascariasis. Of cases without other diseases 27 per cent. died. In 29 of the 162 cases (18 per cent.) the acute symptoms had followed anthelmintic treatment ; in others no exciting cause was found. Five clinical types are described. *Acute inflammation of the alimentary tract* occurred in 86 cases, with 22 deaths. The onset was acute with very severe vomiting, first of food and then of clear fluid and possibly worms (vomited by 58 patients) ; diarrhoea also occurred (34 cases) and dehydration, collapse, feeble pulse, a rise of temperature and sometimes tetany followed (in two cases). In these cases the disease resembled acute infective diarrhoea and the patients either died or recovered rapidly after two days. Blood and mucus in the stools may suggest dysentery. For the dehydration and severe circulatory depression 5 per cent. glucose saline was given parenterally ; vomiting was controlled by stomach lavage and adrenalin m.10 in a teaspoonful of iced water every hour for four or five doses. Calcium gluconate was given parenterally for tetany.

The toxic and cerebral type of the disease occurred in 15 cases. In eight it followed the use of an anthelmintic, but was not due to the drug or to cerebral malaria. There were eight deaths and three others probably died at home. The onset is usually sudden and the dominating symptom is extreme restlessness ; severe thirst, rapid rise of temperature, deep and rapid respirations occur and in a few hours there may be delirium, convulsions and semi-consciousness. Death may occur or recovery in 2–3 days. Encephalitis or meningitis may be simulated. The treatment of this type was symptomatic and was not satisfactory.

A third type of case shows *acute abdominal symptoms*. The authors had 34 cases of this kind with five deaths. Worms were palpable in 23, the condition followed the use of an anthelmintic in four only. The commonest signs are those of partial intestinal obstruction ; an anthelmintic may expel some of the worms, but more often it causes the partial obstruction to become complete Other cases simulate acute appendicitis ; they may subside spontaneously or peritonitis or intussusception may develop. In such cases the intestine contracts on the worms, and in this connexion the authors refer to the work of Rost [this *Bulletin*, 1921, v. 17, 80] showing that whole extracts of total Ascaris increase the tonus of the intestinal wall, while extracts of its cuticle relax it. The authors were able to remove many of the worms by giving belladonna, atropine or hyoscyamine in full doses every 2–3 hours to relax the intestinal wall, and liquid paraffin to lubricate the intestinal contents. Opium or morphia may be given to relieve severe pain. Olive oil enemata help to remove worms from the lower bowel. After this treatment has expelled worms, an anthelmintic may kill and expel more. Obstructive symptoms were thus relieved in 27 of the 34 patients.

The respiratory type was seen in 12 cases ; there were no deaths. It is due to larval infiltration of the lungs. The onset is rapid with cough, dyspnoea and rise of temperature ; recovery usually follows in 4–5 days. Larvae were never found in the sputum and may not be found unless the infestation is massive. Treatment included diaphoretics, expectorants and oxygen. In 14 cases these types were *mixed* and 10 of these patients died. Complications due to the migration of the Ascarids occurred in only one case in which an Ascaris in the trachea of a child of 4 caused fatal asphyxia. The hospital records during 1938–1941 showed four other cases, the worms being found in the common bile duct, the pleural and peritoneal cavities and under the capsule of and in the liver.

In all cases the diagnosis was confirmed by finding Ascaris in the alimentary canal. The authors state that no satisfactory cutaneous test is available for general use and that X-ray examination may be useful but is hardly necessary.

Discussing their results, the authors refer to work on the haemolysis of mammalian red blood cells by extracts of Ascaris, on the production of urticaria, asthma, etc., by the injection of Ascaris extracts and on the antitryptic action of Ascarid extracts. They quote records of severe intoxication or involvement of the nervous system in ascariasis, which are, they think, striking features of the disease in children. They occurred in 17 per cent. of their cases and were responsible for 38·3 per cent. of the deaths among these. They discuss experimental work which suggests that, in this type of case, Ascaris toxins cause degeneration of the liver and suprarenal gland, so that failure of these glands may be a factor. Anaphylactic shock and allergy in ascariasis are also discussed. *G. Lapage.*

HAMANN, C. B. **Estimation of Histamine in the Blood and other Tissues of Rats and Guinea Pigs infected with** *Trichinella spiralis*. *J. Parasitology*. 1943, Dec., v. 29, No. 6, 367–72, 2 figs. [14 refs.]

Little is known about the toxicology of trichiniasis. One product of tissue destruction is believed to be histamine. Because acute symptoms of trichiniasis appear at the height of tissue invasion and presumably of tissue destruction by Trichinella, the author undertook a study of the histamine content of the blood and some other tissues (lung, intestine, kidney, skeletal muscle, liver) of albino rats and guinea-pigs experimentally infested with Trichinella. He concludes that there is an increase of histamine in the blood and possibly in some other tissues, but that the results are difficult to evaluate because of the variability of both the experimental animals and the controls ; also we know little about the significance of slight changes in the histamine content of blood and the tissues ; nor do we know how quickly histamine may be excreted or destroyed.

FLURY (1913. *Arch. exp. Path. u. Pharm.*, v. 73, 164) suggested that toxic effects of Trichinella are due, not to a single substance, but to a group of purine bases and creatine derivatives such as methyl guanidine. HARWOOD, P. D., SPINDLER, L. A., CROSS, S. X. and CUTLER, J. (1937. *Amer. J. Hyg.*, v. 25, 362) noted an increase of guanidine in rabbits experimentally infested with Trichinella, but SOLLMAN, T. (1942. *Manual of Pharmacology*, Saunders, Philadelphia) doubted the significance of methyl guanidine.

The author found that doses of 6,000 larvae per rat and 3,000 larvae per guineapig gave satisfactory infestations. The fact that the symptoms were more uniform in guineapigs supports the view of Roth, H. (1939. *Amer. J. Hyg.*, v. 29(D), 89) that the guineapig is the better animal of the two for experimental work on trichiniasis. The diaphragms of all the rats and guineapigs were examined for the presence of Trichinella before histamine assays were done on them. These assays were done on rats 16–18 days, and on guineapigs 23–26 days, after the larvae were given to them. Assays on the blood were done by the method of Code, C. F. (1937. *J. Physiology*, v. 89, 257) which is a modification of the method of Barsoum, G. S. and Gaddum, J. H. (1935. *Ibid.*, v. 85, 1). Assays on other tissues by the method of Best, C. H. and McHenry, E. A. (1930. *Ibid.*, v. 70, 349) as modified by Rose, B. and Browne, J. S. L. (1941. *Amer. J. Physiol.*, v. 131, 589). The whole blood method of Rosenthal, S. R. (1937. *Ann. Surg.*, v. 106, 111) gave erratic results and was discontinued.

The histamine content of the blood of 20 control guineapigs varied from amounts not detectable to 2·0 gamma/cc. of blood (mean 0·7 gamma/cc.) ; that of 21 experimentally infested guineapigs varied from amounts not detectable to 4·0 gamma/cc. (mean 1·5 gamma/cc.). In 23 control rats the histamine content varied from amounts not detectable to 3·5 gamma/cc. (mean 0·5 gamma/cc.), while in 25 experimentally infested rats it varied from 0·04 to 5·0 gamma/cc. (mean 1·4 gamma/cc.). In the liver, kidney and skeletal muscle of rats and guineapigs there was no significant difference between the histamine content of the controls and experimentally infested animals, but the intestinal tissue of guineapigs showed, when marked duodenal inflammation was present (in only a few guineapigs), values up to 8·0 gamma/gm. (controls only 1·0 gamma/gm. or less). In lung tissue the mean values were : infested rats, 4 gamma/gm., controls 5·3 gamma/gm. ; infested guineapigs, 4 gamma/gm. ; controls 2·3 gamma/gm.

A slight eosinophilia was found in both infested rats and guineapigs, which was less consistent in the guineapigs. There was no consistent correlation between this eosinophilia and the blood-histamine values in either the rats or the guineapigs. *G. Lapage.*

DEFICIENCY DISEASES.

Lee, D. H. K. **Nutrition in the Tropics.** Reprinted from *Australian J. Sci.* 1943, Aug., v. 6, No. 1, 6–9.

In this short paper a number of statements are made which should be better appreciated by medical men and the general public alike. Some of the points are as follows :—There is no evidence that the consumption of quite large quantities of protein is deleterious in hot climates. Fat is not needed so much as in colder climates. The need for extra salt is now well known ; the author advocates the following :—

Weather	Acclimatization	Work	Added Salt Daily	
			Grams	Ozs.
Hot dry	Unacclimatized	Heavy	14	0·5
,, ,,	,,	Moderate	7	0·25
,, ,,	Acclimatized	Heavy	7	0·25
,, ,,	,,	Moderate	—	—
Hot wet	Unacclimatized	Heavy	7	0·25

If carbohydrate is increased it is essential to see that enough of the vitamin B complex is taken. Reduction of body water leads to constipation, but this can be offset by increasing the roughage taken, especially by increased consumption of vegetables and fruits. Alcohol should be taken very dilute. Boredom and isolation are adverse social factors, and can be mitigated by variety and attractiveness in diet and in the circumstances of eating.

The food habits of the various races must be taken into consideration in planning food economy, and it must take a considerable time before these can be overcome by educational effort. Local food production in Australia needs revision, and the tendency to regard the country as a series of one-crop areas should be avoided. Mixed production is essential and emphasis is laid on the cultivation of vegetables and of the fruits which can be grown in such profusion. Distribution and storage of foods, and the provision of fast refrigerated transport, are matters of moment.

Education of the general population in the principles of good diet must be pressed, and the most telling campaigns will be those conducted through schools and baby clinics. Planned settlement of the country is imperative; "undoubtedly monetary interests will come into conflict with such planned settlement, but until biological necessities gain precedence in our social system over sectional economic interests, reconstruction will be very incomplete."

Charles Wilcocks.

Le Riche, H. **A Health Survey of 3,510 African School Children in Alexandra Township.** 16 pp., 10 figs. [13 refs.] 1943. Johannesburg: Witwatersrand University Press. [Summary appears also in *Bulletin of Hygiene*.]

Alexandra Township is in an area in the Transvaal Province, 9 miles from Johannesburg, where Africans have a right to purchase land on freehold tenure. There are so few of these areas that there is keen competition for the small plots of land, and consequently they command high prices. This, coupled with the low incomes of the people, has made it difficult for them to pay for their land and houses, which are heavily mortgaged. In order to increase their income the owners have erected blocks of rooms on their properties, which are let to poorer families, and this has resulted in considerable overcrowding. The health survey described in this paper consisted of a clinical examination of 3,510 African children, aged 6 to 16 years, attending four schools in the township. It is pointed out, however, that since attendance at school is not compulsory, children who do attend school tend to come from better homes than those who do not.

The tests applied in the clinical examination are illustrated by some rather novel pictures. It was concluded that about one-quarter of

the children were deficient in musculature and sub-skin tissue, and it is thought that this was due to chronic food lack. A few complained of tenderness of the muscles of the extremities, which may or may not have been due to scurvy. The posture of 53 per cent. of them was considered to be satisfactory; 11 per cent. had knock-knee, but only 0·3 per cent. showed enlarged wrists, and there were 10 cases of beading of the ribs. Skin lesions due to dietary deficiency appeared to be very common—36 per cent. of the children were suffering from phrynoderma and 43 per cent. of them from "Mosaic," but the co-existence of syphilis was thought to be a complicating factor. Out of 496 Wassermann tests taken at one school, 64 (12·9 per cent.) were positive. Eyes, ears, nose, lips and mouth were also examined. Only 0·6 per cent. were suffering from Bitot's spots, thought to be due to a vitamin A deficiency; 15·4 per cent. showed signs of cheilosis and 2·8 per cent. angular stomatitis, both considered to be caused by a deficiency of riboflavin; 31 per cent. had slight dental caries and 11·7 per cent. severe caries; 12·8 per cent. had spongy bleeding gums, but it is suggested that this may have been due to faulty dental hygiene or secondary syphilis and not necessarily to scurvy.

There was a very high incidence of enlarged glands, 73·4 per cent. had enlarged glands of the neck. Slightly enlarged thyroids were found in 1·8 per cent. of the children. Chests, lungs, hearts and abdomens were also examined. The final classification of the children was made into three groups. In 39·6 per cent. of them no abnormality was detected, 50·6 per cent. required nursing or medical supervision, and 9·8 per cent. were obviously ill and required hospitalization.

It is recommended that all children in the township shall receive periodical medical examinations, that a part-time dentist and a school nurse are required, and that school feeding should be instituted forthwith. *E. M. Widdowson.*

KARK, S. L. **Adult and Infant Pellagra in South African Bantu. A Comparative Clinical Study.** *South African J. Med. Sci.* 1943, July, v. 8, No. 2–3, 106–114. [45 refs.]

In this *Bulletin* [1936, v. 33, 729, 815, 885] all the records relating to pellagra were summarized to that date, including infantile pellagra. The author gives a list of these records and most usefully brings the series up to July 1943.

He then considers 96 cases coming under his own observation; 62 of the disease in adults, 34 in infants and young children. Fifty-three cases were seen in Johannesburg, 43 in rural areas of Polela and Impendle, Natal.

All those who have been interested in the disease as seen in young children in Africa will read this article with advantage.

To Dr. Kark was given the opportunity of studying the disease in the adult and in the infant, side by side, an opportunity denied to those who first wrote concerning the infantile type in East and West Africa and failed to recognize the pellagrous nature of the affection.

In discussing his cases the author points out the likeness of all essential symptoms in the two age groups, any differences being due to the acuteness of the disease in infants.

[His findings confirm, therefore, the view always held by the reviewer.] *H. S. Stannus.*

i. Hua, T. J. & Cheng, S. Y. **Preliminary Report of Pellagra Outbreak in Kowloon.** *Caduceus.* Hong Kong. 1941, Feb., v. 20, No. 1, 1–12, 2 graphs & 15 figs. on 10 pls.

ii. Wilkinson, P. B. & Au King. **Retrobulbar Neuritis due to an Avitaminosis.** *Ibid.*, 13–21, 3 folding pls.

Pellagra was considered a comparatively uncommon disease before the war. Now, however, the affection is becoming a matter of some importance among the refugee population.

i. In the last three quarters of 1940, 185 males, mostly between 30 and 50 years of age, and 235 females between 40 and 50 came under observation, of whom 137 died (32·6 per cent.).

The authors classify their cases as (1) those with dermatitis, (2) those with dermatitis and diarrhoea, (3) those with dermatitis, diarrhoea and marked prostration, (4) those with marked mental symptoms.

The symptoms, in great part common to all, were—burning, tingling and numbness of the skin, typical dermatitis, chiefly on exposed surfaces and pressure points, with bullous formations in many, blepharitis, stomatitis, angular stomatitis, glossitis, dysphagia. Meningism was present in some and what the authors refer to as beriberi symptoms in 56 per cent. The eyes were not examined.

[In one place the authors say " while deficiency of vitamin B_2 as a cause of pellagra may be considered proved . . ." This is not very clear, but presumably the reference is to nicotinic acid.]

ii. In six months the authors have met 15 cases of a condition diagnosed as retrobulbar neuritis among refugees, believed to be suffering from pellagra, with symptoms described as sore tongue, giddiness, palpitation, acroparaesthesiae, weakness in the limbs, etc.; in one oedema of eyelids noted, in one scrotal eczema, in two perlèche (*sic*), in one the canthi were affected, one had a pellagrous rash.

In 11 of the 15 cases (11 males and 4 females) the fundus was normal, 4 showed some degree of optic atrophy with temporal pallor of the discs, one complained of photophobia but only on being asked, all except two exhibited a sluggish pupillary reaction to light and poor maintenance of contraction. Examination of the fields showed concentric or quadrantic contraction in all except two, but the authors were unable to demonstrate central or paracentral scotoma for white, red or green.

Patients were stated to have no neurological symptoms.

Regarding treatment—nicotinic acid 100 mgm. per day for one week is said to have caused much improvement in visual acuity. One drachm of yeast thrice daily brought about cure. To a single patient 1 mgm. riboflavin thrice daily was given, vision was restored from 6/36 to 6/6 in each eye in 10 days. To a second patient, given 3 mgm. riboflavin daily for 2 weeks without improvement, thiamin (Betaxin) 3 mgm. by injection was added, but without effect; during the fourth week 50 mgm. nicotinic acid twice daily were administered with improvement.

[These cases obviously belong, as the authors suggest, to the group, now probably well known, to which also belonged those described by Fitzgerald Moore [this *Bulletin*, 1934, v. 31, 820; 1938, v. 35, 72) and Landor and Pallister (see *Bulletin of Hygiene*, 1935, v. 10, 733). They all respond to yeast, but unfortunately no one has yet

carried out controlled experimental treatment in such a way and upon such numbers as to be of value in suggesting the true aetiology.]

H. S. Stannus.

HAEMATOLOGY.

MERA, B. Preliminares del estudio de la meniscocitemia en Colombia. [**Preliminary Study of Sickle Cell Anaemia in Colombia.**] *Bol. Oficina Sanitaria Panamericana.* 1943, Aug., v. 22, No. 8, 680–82. English summary.

"Sickle Cell Anemia is a blood disease found in negroes or descendants of negroes. There are two forms: latent sickle cell disease or sickle cell trait, in which there is only cell deformation; and active sickle cell anemia with active clinical manifestations. Puerto Tejada, a Colombian town with an 80 per cent. negro population was chosen for an experiment. All school children between the ages of 7 and 17 were studied as to the presence of sickle cell disease. Of the 489 negro children examined, 46 or 9·4 per cent. proved positive. Of them, 5·45 per cent. suffered from sickle cell trait and 3·95 per cent. from sickle cell anemia. Symptoms in the second group included anemia, jaundice, permanent weakness, abdominal colics, leg ulcers, etc. In many cases, the disease is hereditary, and its presence explains many pathological conditions of the negro race in Colombia. More complete research is expected to be carried out in the very near future."

DERMATOLOGY AND FUNGOUS DISEASES.

MOORE, M. & MANTING, G. **Sporotrichosis following a Mosquito Bite. Description of Lesions in a Girl of Indian and French Descent.** *Arch. Dermat. & Syph.* 1943, Nov., v. 48, No. 5, 525–6, 1 fig.

When Indian and white blood is mixed the apparent immunity shown by Indians to certain cutaneous diseases commonly found in the white race is lost, and it is noteworthy that sporotrichosis has never been reported in the full-blooded American Indian. In the case here described only three-eighths of the blood is French. Since the organism may grow saprophytically in the soil and has been found on many plants it is not unlikely that the mosquito can occasionally act as vector, as it seems to have done in this case. The girl, now aged 9 years, was born in Missouri and had never been out of the State. She was bitten on the left wrist by a mosquito some five months before she attended hospital. The affected area became a papule and then a nodule which later softened and broke down to form an ulcer. Other nodules then developed along the anterior aspect of the forearm, in turn rupturing to form persistent ulcers with indurated and raised edges. The borders were undermined and violaceous, whilst the centres showed bright red verrucous granulation tissue. Microscopically the organism was identified as *S. schencki*. Saturated solution of potassium

iodide was given three times a day, the starting dose being 10 drops. After the fourth day each dose was increased daily by 1 drop. An ointment containing 4 per cent. bismuth tribromphenate was used locally. There was great improvement after months.

Sydney Thomson.

Baliña, P. L., Bosq, P., Barnatán, M. & Herrera, J. A. Un caso de blastomicosis ulcerosa. Beneficio de la sulfamidoterapia. [**A Case of Ulcerating Blastomycosis ; Improvement with Sulphonamide Treatment.**] *Rev. Argentina de Dermatosifilologia.* 1943, Sept., v. 27, No. 3, 451–3, 2 figs.

An Englishman, 48 years of age, an estate manager in the Argentine, in December 1939 had several teeth in the lower jaw extracted for pyorrhoea. An erosion, obstinate to treatment, persisted in the gum but cleared up after 20 sessions of radiotherapy. In November 1940 a small reddish nodule appeared on the right nostril ; no biopsy was made but X-ray therapy was again given (94 sittings) and radium applications twice. The lesion, nevertheless, ulcerated and extended to destroy both nostrils and was spreading to the cheeks, especially the left. He then came under the authors' care. The diagnosis rested between blastomycosis and leishmaniasis ; biopsy showed it to be the former. Sulphathiazole, locally and *per os*, was started, 4 gm. daily, and improvement was observable in a week. The lesion ceased to spread and repair started. He had had, at the time of reporting, 165 gm. ; the lesions on the cheeks had cicatrized and the nostrils were healing. Much time had been lost and disfigurement resulted from failure of correct diagnosis.

H. Harold Scott.

Albert, M. **A Note on a Case of Blastomycosis cured by Sulphapyridine and Sulphathiazole.** *Brit. J. Dermat. & Syph.* 1943, Dec., v. 55, No. 12, 294–6, 1 fig.

Baliña, P. L., Herrera, J. A., Bosq, P. & Negroni, P. Tercer caso argentino de histoplasmosis. Beneficio de la sulfamidoterapia. [**The Third Case of Histoplasmosis recorded in Argentina. Sulphonamide Therapy.**] *Rev. Argentina de Dermatosifilologia.* 1943, Sept., v. 27, No. 3, 453–4, 2 figs.

An Argentinian of 49 years, in municipal employ, in December 1941 had what he thought was an ordinary pimple of the left nostril. As time went on, instead of healing, it ulcerated and extended over the left nostril and the nasal septum, with infiltration and oedema and copious mucopurulent secretion, and was intensely painful. It was thought to be mycotic and a biopsy showed it to be histoplasmosis. Treatment by sulphonamides was begun and in nine months he had had 96 gm. of sulphanilamide and 220 gm. of sulphathiazole. The latter was applied locally also. Improvement was soon observable and now the lesion has largely cicatrized. Progress would probably have been more rapid had the patient not had to interrupt the course of treatment. Photographs show well the condition before and after treatment. [See also Negroni, this *Bulletin*, 1941, v. 38, 534.]

H. Harold Scott.

MISCELLANEOUS.

KHARTOUM. **The Kitchener School of Medicine. Seventh Report 1939–1942.** 88 pp., 4 pls.

Since 1924 the School has admitted 138 students and has passed out 82 graduates who are licensed to practise medicine in the Sudan. Normally, after a medical course lasting six years, successful candidates, having passed the final examination, are required to spend two years as residents in certain hospitals. At the end of this period, if reports show them to be fit to carry on medical duties without supervision, they are accepted to the rank of Sudanese Medical Officer of the Sudan Medical Service. Post-graduate classes are organized locally, but graduates selected to fill senior posts are sent to London for post-graduate study.

In the reports here presented for the years 1939–42 a very comprehensive account is given of the syllabus and of the activities of the students; it is evident that much thought has been given to the question of what is to be taught, and that the training is very comprehensive. It is therefore important to know to what extent that training succeeds in producing efficient doctors, and on this point the comments of visiting examiners are illuminating. [It should be understood that all examinations are conducted by external examiners and that the final examinations are under the supervision of a Visitor appointed by the Royal Colleges of Physicians and Surgeons.] For 1939 the Visitor was Sir Adolphe ABRAHAMS, and his report is almost entirely favourable. For 1940 permission had been obtained from the Royal Colleges to proceed without a Visitor, but the services of Lt.-Col. F. N. FOSTER and Lt.-Col. E. G. OASTLER were secured; their brief report also was very favourable. For 1941 Col. J. S. K. BOYD and Col. A. E. RICHMOND presented reports which expressed opinion of the candidates much less favourable than those of the previous years. For 1942 the Visitor, Maj.-Gen. W. H. OGILVIE made the satisfactory comment that the clinical part of the final examination was better done than the papers, an opinion directly contrary to those of his predecessors.

Comments were made on accommodation, organization and teaching material; it is evident that the shortage of post-mortem work, which is difficult because of the religious customs of the people, is a serious handicap.

The chief criticism of the students was that they appeared to have learned their subject rather from books and lectures than from their own observations and investigations, and that they were less at ease when confronted by a patient than when asked a question which could be answered from recollection of what had been taught [Maj.-Gen Ogilvie did not subscribe to this opinion]. Col. Richmond remarked, however, that his criticism related to the students he examined, and that they were probably not so highly intelligent as men from previous classes, whom he had met at work in the Sudan.

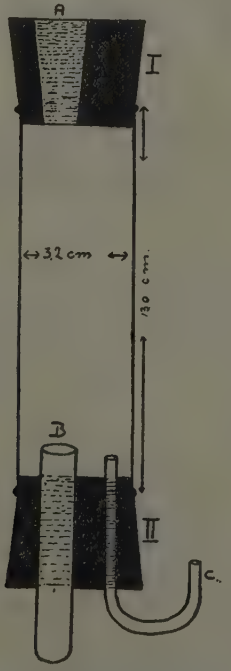
[It would be surprising if these students did not show some tendency towards undue respect for the written word or the authority of teachers. The Moslem way of life inculcates something of that frame of mind, and the respect paid by literate Mohammedans to the Koran must be instilled into children from an early age. To change from unquestioning acceptance to an attitude of critical evaluation depends not only upon the teaching given at a medical school, but also upon the

attitude of the teachers in the primary schools and, perhaps most important, upon the atmosphere of the home in which infancy and early childhood are spent. It may well be that one or more generations will be needed before an undergraduate in the Sudan enters upon his medical course in a critical frame of mind.]

There seems to be little doubt that the spirit of the school is happy and that the teachers and the Dean are enthusiasts, but emphasis is laid in the reports on the need to improve the pre-medical education, in all branches of general culture. [The report is a heartening indication that the Government is training Africans to take responsibility for the welfare of their own people.] *Charles Wilcocks.*

PLUM, C. M. **A Method for collecting Large Samples of Blood from Living Rats.** *Acta Physiol. Scandinavica.* 1943, v. 6, No. 4, 289–90, 1 fig.

With the simple apparatus shown in the figure 1 or 2 cc. of blood may be taken from the tail of a rat and this repeated at short intervals. The hole (A) in the rubber stopper has a diameter of 1·6 cm. at the outer



Apparatus for taking blood samples from tail of living rat.
[Reproduced from *Acta Physiologica Scandinavica.*]

end and 1 cm. at the inner end. The test tube (B) is 1 cm. in diameter ; the tube (C) is connected to a vacuum pump.

The rat's tail, well smeared with vaseline, is passed through hole (A) and suction is applied for about two minutes ; the rubber stopper (II) is removed and the end of the tail snipped off, the end of the tail put into tube (B) and suction again applied. In 2–3 minutes 1–2 cc. will have collected in the test tube ; since rat's blood readily coagulates it is well to have a little dry anticoagulant in the test tube. If the collection of blood has to be repeated at short intervals the tail is dressed in the meantime with collodion on cotton wool. *J. F. Corson.*

BALL, G. H. **Parasitism and Evolution.** Reprinted from *Amer. Naturalist.* 1943, July–Aug., v. 77, 345–64. [74 refs.]

Many parasitologists have accepted without question the dictum that length of association of a parasite with a particular host leads to a condition of non-pathogenicity and, *vice versa*, a parasite which is highly pathogenic to a host is one which has only recently adopted this host. In his presidential address before the Western Society of Naturalists, Stanford University, the author questions this generalization and illustrates his remarks by reference to a number of instances amongst the protozoa and helminths in which the reverse appears to be the case. He concludes by stating that "as biologists, we may all agree on one aspect of nature, namely, its exceeding variety. Even a parasite may choose the course of manifest destiny and find aggressiveness more attractive and more valuable than an existence of peace and symbiosis." *C. M. Wenyon.*

i. VAIDYA, S. K. **Observations on "Tropical" Eosinophilia.** *Indian Physician.* 1943, Oct., v. 2, No. 10, 358–65.

ii. WEINGARTEN, R. J. **Tropical Eosinophilia.** [Correspondence.] *Ibid.* 369–72.

i. Vaidya inveighs against the synonym "eosinophilic lung" for this condition and "tropical eosinophilia," though less committal, has not yet been proved very appropriate ; the author appears to view it as asthma. The patients were seen by him in Bombay. [He repeatedly uses the term "disease entity" without defining it and, strictly interpreted, the term has no meaning ; a "disease entity," as Clifford ALLBUTT long ago pointed out, is non-existent]. Very instructive cases are quoted in which the total leucocytes might be over 60,000 per cmm. with eosinophiles 75·6 per cent. ; at another time the same patient had a count of 56,600 and an eosinophilia of 87 per cent. The response to neosalvarsan injected intravenously at weekly intervals in doses of 0·3–0·45 gm. was very satisfactory. Relapse may occur three or more years later, the interval being free from attacks, but response again follows administration of neosalvarsan.

ii. Weingarten stresses the differences between tropical eosinophilia and asthmoid bronchitis and Loeffler's syndrome, stating that in asthmoid bronchitis there is not a leucocytosis and only moderate eosinophilia without pulmonary infiltration, and in Loeffler's syndrome the clinical and radiological signs disappear rapidly and spontaneously. [Differences from ordinary spasmodic asthma will be obvious when one reads that a course of six injections at weekly intervals "establishes a practical cure" and that free intervals are as long as 3½ years or more. See this *Bulletin*, 1941, v. 38, 538, 539 ; 1943, v. 40, 720, 721, 948 ; and *Bulletin of Hygiene*, 1936, v. 11, 296.] *H. Harold Scott.*

ALWALL, N. Ein Beitrag zur Frage der Pathogenese, Ätiologie und Therapie der eosinophilen Lungeninfiltrate. [**Contribution to the Question of the Aetiology, Pathogeny and Treatment of Pulmonary Infiltration with Eosinophilia.**] *Schweiz. med. Woch.* 1943, Nov. 27, v. 73, No. 48, 1438–40, 2 figs.

The author gives brief notes of four cases of what is known as Loeffler's syndrome—pulmonary infiltration with eosinophilia. The first patient was a woman of 47 years who gave a history of bronchitis for five years past and between 1939 and 1941 had repeated attacks of "asthmatic bronchitis." In November 1942 she had transient lung infiltration, with eosinophilia 28 per cent. In January 1943 she had a return of the pulmonary condition with slight rise of temperature and an eosinophilia of 47 per cent. Expectoration was scanty and colourless, but Pneumococcus Type 31 was isolated from it on two occasions and she was given sulphathiazole from January 26th to February 6th, with good effect. At the end of February and again in March she had a return of the lung condition, the last time with Type 33 Pneumococcus. During her illness she also had complained of pain in the joints.

The second patient was a woman of 36 years who had suffered much from cough for 14 years, and since 1937 with shortness of breath with the cough. During 1940 she was in bed for some months with fever, and for a time was in hospital; transient pulmonary infiltration was found with eosinophiles ranging between 7 and 47 per cent. In February 1943 she was again confined to bed with subfebrile temperature, pulmonary infiltration, eosinophilia 20–32 per cent., and in her sputum Pneumococcus Type 7 was found. She had had relapses intermittently for three years.

The third was a woman of 47 years with chronic otitis since the age of five years, bronchitis of an asthmatic type for the past ten years, and attacks of pulmonary infiltration with eosinophiles to 10 per cent. During the preceding 18 months she had had articular rheumatism, which cleared up when the lung conditions appeared.

The fourth patient was a woman of 41 who had had repeated attacks of asthma since 1937, and in the autumn of 1942 "pulmonary infiltration of the Loeffler type" with eosinophiles up to 35 per cent. For ten years she had complained of rheumatic pains in her joints. These have never left her altogether, but were always slightest when the asthma was at its worst.

Collating and comparing the four cases we see that pneumococci were found in two and benefit followed treatment with sulphathiazole; that three suffered from articular rheumatism, "an allergic manifestation," says the author, "not previously stressed as present in Loeffler's disease," and that relapses occur in this condition. "Examination for Pneumococci must not be omitted in refractory cases, as the benefits from chemotherapy (sulphathiazole) or from specific serum-therapy [which, however, is not mentioned in any of the four cases] are great."

H. Harold Scott.

EMERSON, K., Jr. **Tropical Eosinophilia.** *U. S. Nav. Med. Bull.* 1944, Jan., v. 42, No. 1, 118–23, 1 chart.

The author describes the case of a man, aged 30 years, who presented all the characteristic signs and symptoms of what has been named tropical eosinophilia by WEINGARTEN, and as Loeffler's syndrome or

"eosinophilic lung" by others [though Weingarten distinguishes the first-named from the others mainly by the fact that the clinical and radiological signs in Loeffler's syndrome disappear rapidly and spontaneously, whereas tropical eosinophilia may persist for a long time unless appropriate treatment by arsenicals such as neosalvarsan, is undertaken].

The patient in question had suffered from asthmatic attacks in 1936–37, and then went to India where he worked for 4½ years, in excellent health except for attacks of diarrhoea. In 1942 he was passed fit for a Commission in the Naval Reserve. Four months later he had a return of his attacks of asthma, this time accompanied by increasing fatigue and loss of weight. For nearly two months he had fever and at the end of February 1943 he was operated upon for hepatic abscess. About three weeks later, the leucocytosis, which had fallen after his operation, increased to reach 32,500 per cmm., 78 per cent. of which were eosinophiles, but there was no fever. Asthmatic attacks, with moist râles and rhonchi, continued and by X-rays a diffuse faint mottling was seen. Treatment on the usual lines for asthma brought very little relief until the suggestion was made that the case might be one of tropical eosinophilia. Carbarsone, 0·25 gm. twice daily, was given for ten days and a second course after an interval of ten days. By that time the leucocyte count was normal and the eosinophile percentage was 9. The cough disappeared and the physical signs in the chest cleared up.

[This peculiar condition has repeatedly been referred to in this *Bulletin*; the leucocytosis may reach higher values than that of the case here reported, 60,000 or more and eosinophiles 87 per cent. It is known, also, that relapses may occur after intervals of three years and even longer, and if the condition is found to occur in places other than India (in Bombay especially) the state recorded in 1942 in this patient may have been the same as that in 1936–37. There is much yet to be learned concerning the so-called Tropical Eosinophilia. See this *Bulletin*, 1941, v. 38, 538, 539; 1943, v. 40, 720, 721, 948.]

H. Harold Scott.

CHAKRAVARTY, U. N. & ROY, S. C. **A Case of Tropical Eosinophilia.** *Indian Med. Gaz.* 1943, Dec., v. 78, No. 12, 596–7.

SHAH, R. L. **A Case of Pseudo-Tuberculosis of the Lungs with Eosinophilia.** *Indian Med. Gaz.* 1943, Dec., v. 78, No. 12, 597.

STEIN, H. B. & MILLER, E. **Onyalai and Acute Thrombocytopenic Purpura.** *Clin. Proc.* Cape Town. 1943, Oct., v. 2, No. 10, 347–54.

In this informative paper the authors review the similarities, and hence the possible relationship, between onyalai and thrombocytopenic purpura. In an instructive table they set out the similarities and differences; the similarities are many and the differences few, namely the geographical limitation of the former to Africa, the age and sex incidence (onyalai affecting mostly adult males, the latter children and young adults, and females more than males) and, lastly, the fact that the former is usually an acute condition, the latter chronic, but no hard-and-fast distinction is possible as regards the last. Clinically, haemorrhagic bullae are a characteristic feature of onyalai, but they have not been described in thrombocytopenic purpura.

The authors then record in detail the case of a European woman of 39 years exhibiting purpura associated with nephrosis; she had also had deep X-ray therapy but whether this played a part in producing the purpura is not known. Four months later she had haemorrhage from the nose and mouth and there were two haemorrhagic bullae on the right cheek and three smaller ones on the tongue, with purpuric spots on legs and arms. This sequence and the coexistence of purpura and bullae on the second admission to hospital are strong evidence that there is a close connexion between the two diseases; they may even not be two, but onyalai may be an aggravated form of acute idiopathic purpura. [See also GILBERT, below.] *H. Harold Scott.*

GILBERT, B. **Onyalai: a Tropical Condition characterized by Haemorrhages: its Gynaecological Aspects.** *J. Obstet. & Gynaecol. Brit. Empire.* 1943, Dec., v. 50, No. 6, 437–9.

The author gives a good description of the main features of onyalai and mentions that it belongs to the purpura group and is, in essential, an acute thrombocytopenia. He states that its existence outside Africa is very doubtful, though he acknowledges in his summary that it possibly occurs in Central and South America. Cases recorded as thrombocytopenic purpura with symptoms resembling those of onyalai have been reported in New Orleans. In text-books, bleeding from the genital tract is not mentioned and when it occurs it is liable to be mistaken for menorrhagia. The author records a case occurring in late pregnancy in a multipara; the disease did not interfere with or complicate labour. [See this *Bulletin*, 1938, v. 35, 74, 444 (in the last a case with vaginal bleeding is mentioned); 1939, v. 36, 157, 158, 938; 1940, v. 37, 675]. *H. Harold Scott.*

GRACE, A. W. **Tropical Lymphangitis and Abscesses.** *J. Amer. Med. Ass.* 1943, Oct. 23, v. 123, No. 8, 462–6, 1 chart.

In 1926–28 Dr. Grace was engaged on a special mission of investigation in British Guiana into filariasis, lymphangitis and abscess formation. The results of this were published in a Memoir of the London School of Hygiene and Tropical Medicine [reviewed in this *Bulletin*, 1932, v. 29, 73]. The present article is based on and arises out of the author's previous studies. By tropical lymphangitis he implies cases in which no local lesion or other apparent cause can be found to account for the lymphangitis. It usually comes on suddenly and in 80 per cent. of cases affects the lower limb; the arm, breast and scrotum, in this order, accounting for the remainder. The age group most attacked are those in the second decade and four-fifths are below 30 years of age. The symptoms are usually: severe, deep-seated pain, at first localized, later spreading, followed by an extending erythema with streaks to the adjacent glands, and oedema with fever to 103°F. and considerable prostration; temperature begins to fall in 24 hours, though severe attacks persist for longer, and the symptoms abate and pass off in 2–3 days; there is no desquamation. There may, rarely, be only one attack, but more often there are recurrences and the remissions range between wide limits, from days to years. Hard, tender nodules, 2 by 2 by 0·5 cm., may be felt in the deeper tissues; most of these subside but some progress to abscess formation and from this beta haemolytic streptococcus may be obtained, usually in pure culture.

The author next describes the characters of the growth, the fermentation and serological reactions, virulence, etc., of the organism, based on 68 strains isolated in British Guiana. He found certain differences, mainly of degree, between the streptococcus isolated by him and that common in temperate climates.

The author then discusses the relation of *Wuchereria bancrofti* to this lymphangitis. It seems certain that the worm itself does not produce lymphangitis and yet the condition cannot be ascribed to the streptococcus alone, as the differences from the temperate climate organism do not warrant such a conclusion. The lymph stasis due to the worm seems to render the tissues more sensitive to the streptococcus and its products and " attacks of lymphangitis may be occasioned by organismal or toxic stimuli of intensity too low to be appreciated by tissues previously uninvolved."

Dr. Grace also tried to ascertain in what way the presence of *W. bancrofti* renders the tissues more susceptible by testing 52 patients as to their skin reactions to scarlet fever and British Guiana strains of streptococcus, and by studying the blood, taken at night, from 300 persons with abscesses of known bacterial nature, but unsuccessfully. No relationship could be proved between the presence of filarial embryos in the blood and reaction to the streptococcus or its toxin [see also this *Bulletin*, 1933, v. 30, 228]. *H. Harold Scott.*

HEILIG, R. & PUTTAYA, Mirle. **Coliform-Group Infections of the Urinary Tract: their Clinical Types and Incidence in Mysore.** *Indian Med. Gaz.* 1943, Jan., v. 78, No. 1, 11–18. [15 refs.]

In some cases entered as of " pyrexia of uncertain [not " unknown "] origin " the authors conclude that the cause is infection of the urinary tract by organisms of the *coli* group. They made this diagnosis only when all the other ascertainable causes could be excluded. They examined in 11 months a total of 1,810 patients, 1,246 males and 564 females; 4·5 per cent. of the former and 24·3 per cent. of the latter had such an infection. About three-fourths showed febrile illness, but the type of fever was not characteristic; more commonly it was low and irregular rarely continued high or septic intermittent. The leucocyte count rarely exceeded the normal and the blood sedimentation rate was of no help. The most satisfactory form of treatment was by intravenous injection of 20–30 grains of hexamine. Only in the event of this failing did they resort to sulphonamides, such as sulphapyridine; in some cases both were needed before the condition cleared up. The prognosis, on the whole, is good. Three of the female patients died, none of the males. Five other deaths occurred among the women but, in addition to the bacilluria, they had been suffering from chronic diarrhoea and were moribund on admission. *H. Harold Scott.*

BAGCHI, K. N. & GANGULI, H. D. **Toxicology of Young Shoots of Common Bamboos** (*Bambusa arundinacea* **Willd.**). *Indian Med. Gaz.* 1943, Jan., v. 78, No. 1, 40–42.

Young shoots of *Bambusa arundinacea*, the common bamboo, are used in pickles or as curry in India. Cattle are fond of them also and the owners protect the shoots at the time of the rains when the sprouting begins. Fatal results may follow their consumption. *Sorghum vulgare* belongs to the same Natural Order, Gramineae, and as the latter is

known to be cyanogenetic (*i.e.* contains a glucoside which under certain conditions liberates HCN) the authors examined the bamboo shoots to see if they also were cyanogenetic.

They found HCN present, the amounts in the tips being considerable. Thus, of the commonest species of bamboo in Bengal, near the base the amount was 0·098 per cent., at the tip 0·8 per cent. The enzymic hydrolysis of the glucoside is hindered by acids or alkalis and cooking also prevents hydrolysis by destroying the enzymes; in other words, the human stomach does not afford the best conditions for such hydrolysis, hence cases of human poisoning are rare. The pickled shoots, however, are not boiled and the equivalent of 1 grain of anhydrous HCN—the minimum fatal dose for man—may be obtained from a quarter of an ounce of the uncooked shoots. *H. Harold Scott.*

GERMER, W. D. & BEHRENS, H. Ein Beitrag zur Stechmückenfrage von Gran Canaria. [**A Contribution to the Mosquito Question of Grand Canary.**] *Ztschr. f. Parasitenk.* 1942, v. 12, Pt. 6, 645–58. [Summary taken from *Rev. Applied Entom.* Ser. B. 1943, Dec., v. 31, Pt. 12, 235–6.]

Except for some cases of malaria in the south of the island (the only district in which Anophelines occur) Grand Canary is free from endemic mosquito-borne disease. There were three epidemics of yellow fever in the 19th century, but it has not been recorded since, in spite of considerable traffic with the endemic regions of West Africa and South America, a favourable climate, and a high index of *Aëdes aegypti*, L. (*Stegomyia fasciata*, F.), which is represented by var. *canariensis*, Pittaluga. The other Culicines comprise five species of *Culex* and *Theobaldia longiareolata*, Macq. *A. aegypti* constituted 20–30 per cent. of the mosquitos found in houses in the urban district of Las Palmas, but it was not taken at altitudes above about 1,150 ft. The peak of mosquito abundance and the highest average temperature (27–28°C. [80·6–82·4°F.]) occur in September, but mosquitos are numerous in other months, and even in winter, with an average temperature of 17°C. [62·6°F.], the percentage of *A. aegypti* is not markedly different. The egg, larval and pupal stages lasted 1–2, 12–15 and 2–4 days at 20°C. [68°F.]; the adults lived for 14–18 days, and eggs were laid two days after a blood meal. When reared in water containing urine, ammonia, sodium chloride, sea-water, grape sugar, hydrochloric acid, sulphuric acid, nitric acid or potassium hydroxide, the larvae were able to develop in much higher concentrations than could those of *C. pipiens*, L., or *T. longiareolata*. Their control is difficult because water is stored in quantity, the rainfall averaging only 4 ins. a year. There are 1,640 large open tanks in the urban district of Las Palmas alone, besides those in houses. Goldfish and guppy fish [*Lebistes reticulatus*] were placed in tanks that were suitable, and the keeping of ducks was advised. A mixture of equal parts of kerosene and Diesel oil proved effective for oiling, at the rate of 0·6 fl. oz. per sq. yd.

FAIRCHILD, G. B. **An Annotated List of the Blood-sucking Insects, Ticks and Mites known from Panama.** *Amer. J. Trop. Med.* 1943, Nov., v. 23, No. 6, 569–91. [84 refs.]

The fauna of the Panama area is exceedingly rich and many men have worked there and collected over a long period of years. The

author feels that the present list will be useful as a summary of what is known and which may be required by medical entomologists and others now working in this part of the world.

The list is drawn up in a comprehensive way and includes many bloodsucking insects which are not known to attack man or common domestic animals. It includes ticks and parasitic mites, as well as insects which suck blood or cause myiasis. The author has concluded that it is not for him to make a list of the mosquitoes of the area, a decision which may be wise but which will certainly be regretted by those who use his paper. A full list of references is included.

P. A. Buxton.

PEMBERTON, C. E. **Entomology.** *Rep. Comm. Exper. Station Hawaii. Sug. Pl. Ass. 1941–42.* 1943, 18–22. [Summary taken from *Rev. Applied Entom.* Ser. B. 1943, Dec., v. 31, Pt. 12, 247.]

Aircraft quarantine work was continued in Hawaii during 1941–42 in co-operation with the military and naval authorities, but was discontinued at Midway and Canton Islands in December 1941. The aircraft are sprayed before they are inspected, and most of the insects found were dead, but they included some serious pests, and one live mosquito of the genus *Anopheles* in an aeroplane from California. R. H. Van Zwaluwenburg found that the application of copper sulphate at 1½ oz. per 50 cu. ft. water inhibited mosquito development for at least 2½ months in water stored for fire protection, and, in co-operation with T. Nishimura, that Vatsol (a sulphonated ester of bicarboxylic acid) or 2-7-R (a sulphonated naphthalene) applied at the rate of 2 cc. of a 5 per cent. solution per 1,000 cu. ft. water did so for about six weeks and several months, respectively. He also found that *Baeus californicus*, Pierce, the egg parasite introduced from California for the control of *Latrodectus mactans*, F., was established on Maui in November 1941, over a year after it had been liberated there.

SUTTON, R. L., Jr. **Trombidiosis (Chigger Bites). Relief of Itching with Ethyl Aminobenzoate in Flexible Collodion.** *J. Amer. Med. Ass.* 1942, Sept. 5, v. 120, No. 1, 26–7.

The author recommends the following local appplication to relieve the itching caused by "chigger bites": ethyl aminobenzoate 2 gm. or cc.; flexible collodion 15 gm. or cc. This relieves itching for 4 to 8 hours. [The author applies the term chigger to the harvest mite; this should not be confused with the flea *Tunga penetrans*, to which the name chigger, or jigger, is applied in Africa.] *J. F. Corson.*

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